

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SIG SAUER INC.,
Petitioner,

v.

LONE STAR FUTURE WEAPONS, INC.,
Patent Owner.

Case No. IPR2025-00410
U.S. Patent No. 8,919,238

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,919,238**

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1001	U.S. Patent No. 8,919,238 (“the ’238 Patent”)
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1003	Declaration of John Nixon, EUR ING
1004	Curriculum Vitae of John Nixon, EUR ING
1005	U.S. Patent No. 2,223,004 (“Holek”)
1006	U.S. Patent No. 6,343,536 (“Rossier”)
1007	George M. Chinn, <i>The Machine Gun</i> , Vol. 5 (1987)
1008	Declaration of Dr. Sylvia D. Hall-Ellis
1009	Curriculum Vitae of Dr. Sylvia D. Hall-Ellis
1010	Attachment 1A to Declaration of Dr. Sylvia D. Hall-Ellis - Library of Congress MARC Record for Chinn
1011	Attachment 1B to Declaration of Dr. Sylvia D. Hall-Ellis - MARC Record for Chinn
1012	Attachment 1C to Declaration of Dr. Sylvia D. Hall-Ellis - Library of Congress Authorities MARC Display Record for Chinn

LIST OF CHALLENGED CLAIMS

Claim	Limitation
1[Pre]	A weapon system for firing a round, comprising:
1[1]	a receiver;
1[2]	an operating group configured to operate the weapon system through a charged condition, a firing condition, and a recoil condition, the operating group comprising
1[2a]	a barrel extension at least partially housed within the receiver and arranged to axially translate relative to the receiver;
1[2b]	an operating rod (op-rod) assembly at least partially housed and arranged to axially translate within the barrel extension in the charge condition, the firing condition, and the recoil condition; and
1[2c]	a bolt assembly coupled to the op-rod assembly and at least partially housed and arranged to axially translate within the barrel extension;
1[3]	a barrel coupled to the barrel extension and defining a chamber;
1[4]	a gas accelerator with a first end coupled to the barrel and a second end coupled to the op-rod assembly; and
1[5]	a buffer assembly comprising a drive spring having a first end coupled to the receiver and a second end coupled to the op-rod assembly,
1[6]	wherein, in the charged condition, the op-rod assembly and the bolt assembly are retracted against the drive spring;

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Claim	Limitation
1[7a]	wherein, in the firing condition, the op-rod assembly and bolt assembly are driven by the drive spring such that the round is guided into the chamber and the op-rod assembly and bolt assembly are locked to the barrel extension and a forward momentum of the op-rod assembly is imparted to the operating group and the round is fired,
1[7b]	wherein a portion of an impulse of the fired round stops the forward momentum of the operating group; and
1[8]	wherein, in the recoil condition, the operating group is driven rearward by the remaining portion of the impulse of the fired round, the gas accelerator imparts additional rearward momentum to the op-rod assembly and bolt assembly and stops rearward momentum of the barrel and barrel extension, and the op-rod assembly and the bolt assembly are stopped by the drive spring.
2	The weapon system of claim 1, wherein the buffer further includes a hydraulic piston configured to resist forward and rearward movement of the barrel extension.
3	The weapon system of claim 2, wherein the buffer further includes a buffer spring configured to resist forward and rearward movement of the barrel extension.
4	The weapon system of claim 3, wherein the hydraulic piston and the buffer spring are configured such that any force transfer between the barrel extension and the receiver occurs through the hydraulic piston and the buffer spring.

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Claim	Limitation
5	The weapon system of claim 1, further comprising a lock assembly configured to secure the bolt assembly to the op-rod assembly in the charged condition through chambering the round.
6	The weapon system of claim 5, wherein the lock assembly is configured to release the bolt assembly from the op-rod assembly in the firing condition.
7	The weapon system of claim 6, wherein the lock assembly is further configured to secure the bolt assembly to the barrel extension in the firing condition.
8	The weapon system of claim 7, wherein the lock assembly includes a lock pin, a first cam defined in the op-rod assembly, and a second cam in the barrel extension, wherein the lock pin engages the first cam and the second cam to secure and release the bolt assembly relative to the barrel extension and the op-rod group.
9	The weapon system of claim 8, wherein in a first portion of the firing condition, the lock pin is engaged by the first cam and the second cam to secure the bolt assembly to the op-rod assembly such that the op-rod assembly forces the bolt assembly forward, and wherein, in a second portion of the firing condition upon contact of the bolt assembly and the barrel extension, the lock pin disengages from the second cam and the first cam guides the lock pin such that the bolt assembly forms a locking engagement with the barrel extension.

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Claim	Limitation
10	The weapon system of claim 9, wherein, in the recoil condition, the rearward movement of the op-rod assembly guides the lock pin within the second cam such that the bolt assembly is released relative to the barrel extension.
11	The weapon system of claim 1, wherein in an ejection condition, a case of the round is coupled to the bolt assembly.
12	The weapon system of claim 11, wherein the barrel extension includes an extractor such that, in the ejection condition, the extractor engages the case during the rearward movement of the bolt assembly to remove round from chamber and eject the case from the weapon system.
13[Pre]	A method for firing a weapon, comprising:
13[1]	retracting a bolt assembly and an operating rod (op-rod) assembly relative to a barrel extension against a drive spring;
13[2]	driving the bolt assembly and the op-rod assembly with a forward momentum within the barrel extension such that the bolt assembly chambers a round and contacts the barrel extension, imparting forward momentum to the op-rod assembly, the bolt assembly and the barrel extension such that the round is fired, whereby the firing of the round stops the forward momentum and imparts an impulse of rearward momentum on the op-rod assembly, the bolt assembly, and the barrel extension,

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Claim	Limitation
13[3]	wherein the driving step includes securing the bolt assembly to the op-rod assembly in the charged condition until the bolt assembly engages the barrel extension, wherein the driving step includes releasing the bolt assembly from the op-rod assembly when the bolt assembly engages the barrel extension, wherein the driving step includes securing the bolt assembly to the barrel extension during the contact with the barrel extension;
13[4]	guiding gases from the round with a gas accelerator to drive the op-rod assembly rearward and to stop the rearward momentum of the barrel extension; and
13[5]	absorbing the rearward momentum of the op-rod assembly with the drive spring.
14	The method of claim 13, wherein the driving step includes driving the bolt assembly and the op-rod assembly with the forward momentum that is approximately one-third to one-half of the impulse of the round.
15	The method of claim 13, further comprising the step of restraining movement of the op-rod assembly in forward and aft directions with a buffer assembly.
16	The method of claim 15, wherein the restraining step includes restraining movement of the barrel extension assembly in forward and aft directions with a soft spring and a hydraulic piston valve of the buffer assembly.

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Claim	Limitation
17	The method of claim 13, wherein the step of securing the bolt assembly to the barrel extension includes guiding a cam on the bolt assembly into a cam relief of a hold-up cam on the barrel extension and down an op-rod cam on the op-rod assembly such that a first lock surface of bolt assembly pivots to engage a second lock surface of the bolt assembly.

I. INTRODUCTION

SIG Sauer Inc. (“SIG Sauer” or “Petitioner”) respectfully petitions for *inter partes* review of claims 1-17 (“challenged claims”) of U.S. Patent No. 8,919,238 to Steimke (EX1001, “the ’238 patent”), which is assigned to Lone Star Future Weapons, Inc. As explained herein, a reasonable likelihood exists that Petitioner will prevail with respect to the Challenged Claims. Accordingly, Petitioner respectfully requests that the Board institute *inter partes* review and cancel the challenged claims.

II. CERTIFICATION OF STANDING

Petitioner SIG Sauer Inc. certifies under Rule 42.104(a) that the patent for which review is sought is available for *inter partes* review and that Petitioner is not barred or estopped from requesting an *inter partes* review challenging the patent claims on the grounds identified in this Petition.

III. GROUNDS FOR THE UNPATENTABILITY OF THE ’238 PATENT

SIG Sauer requests *inter partes* review of claims 1-17 of the ’238 patent and a determination that those claims are unpatentable based on the following grounds:

Ground	References	Basis	Claims Challenged
1	Holek	§102(a)	1, 5-7, 13, 14
2	Rossier	§102(a)	1-7, 11, 13-16
3	Holek, Rossier	§103	1-4, 13-16
4	Holek, Chinn	§103	1, 5-13, 17
5	Rossier, Chinn	§103	1, 5-13, 17

This Petition, supported by the declaration of John Nixon (EX1003), the prior art (EX1005-EX1007), and other exhibits filed herewith, demonstrate that there is a reasonable likelihood that Petitioner will prevail with respect to one or more, if not all, of the Challenged Claims. *See* 35 U.S.C. § 314(a).

IV. OVERVIEW OF THE '238 PATENT

A. The Purported Invention

The '238 patent generally describes a goal of reducing the recoil load in an automatic weapon. EX1001 at 1:19-24. In particular, because then-existing conventional automatic weapon systems utilized projectiles with higher impulse rounds, operating systems with impulse averaging have been used in order to mitigate the recoil load. *Id.* These systems typically required the barrel to be fixed to the operating group, resulting in a long and relatively massive operating group. *Id.* at 1:24-27. According to the '238 patent, this design had a number of disadvantages. Due to the large mass of the operating group, a long recoil path was required, which could reduce the firing frequency and increase the complexity of the weapon. Such weapons could also be susceptible to the recoiling mass (and barrel weight) as well as to changes in friction and gravity-induced effects. *Id.* at 1:28-33.

The '238 patent is directed to a weapon system for firing rounds using a receiver and an operating group configured to operate in a charged condition, a

firing condition, and a recoil condition. *Id.* at 1:44-48. The operating group includes: a barrel extension, an operating rod (also called an op-rod) assembly, and a bolt assembly. *Id.* at 1:48-56. Other recited elements include a barrel, a gas accelerator, and a buffer with a drive spring. *Id.* at 1:56-62. In the firing condition, a portion of an impulse of the fired round stops forward momentum of the operating group. *Id.* at 2:2-3. In the recoil condition, the operating group is driven rearward by the remaining portion of the impulse of the fired round, and the gas accelerator imparts additional rearward momentum to the op-rod assembly and bolt assembly and stops rearward momentum of the barrel and barrel extension. *Id.* at 2:3-8.

B. Prosecution History

U.S. Patent Application No. 13/562,078 (the “’078 Application”), titled “WEAPON SYSTEM WITH SHORT RECOIL IMPULSE AVERAGING OPERATING GROUP,” was filed on July 30, 2012. EX1002 at 13. The ’078 Application issued as the ’238 Patent on December 30, 2014. EX1001 at 1. The ’078 Application was filed with 20 original claims and listed David Steimke and Glenn Rossier as inventors. EX1002 at 5, 44-48.

The application received a first office action dated March 27, 2014. *Id.* at 127. The first office action objected to pending claims 3 and 4 on the basis of failing to comply with the enablement and definiteness requirements of 35 U.S.C.

112. *Id.* at 129-130. The office action also rejected all pending claims on the basis of anticipation and obviousness. *Id.* at 131-134. On June 27, 2014, the Applicant amended the pending claims to: (1) replace “self-centering spring” with “buffer spring” in some dependent claims in order to address the enablement and indefiniteness rejections; (2) add a limitation to independent claim 13 (which mirrored limitations found in pending dependent claims 17-19) stating that in “the driving step... securing the bolt assembly to the op-rod assembly in the charged condition until the bolt assembly engages the barrel extension...”; and (3) cancel pending claims 17-19. *Id.* at 165-168. This amendment was made to overcome the Rossier reference (U.S. Patent No. 6,343,536), with Applicant arguing that Rossier did not disclose “the op-rod assembly and the bolt assembly [being] locked to the barrel extension during the firing condition.” *Id.* at 171. On September 10, 2014, the examiner issued a Notice of Allowance and Fees Due, and the ’238 Patent issued on December 30, 2014. *Id.* at 179-183, 199.

C. The Challenged Claims of the ’238 Patent

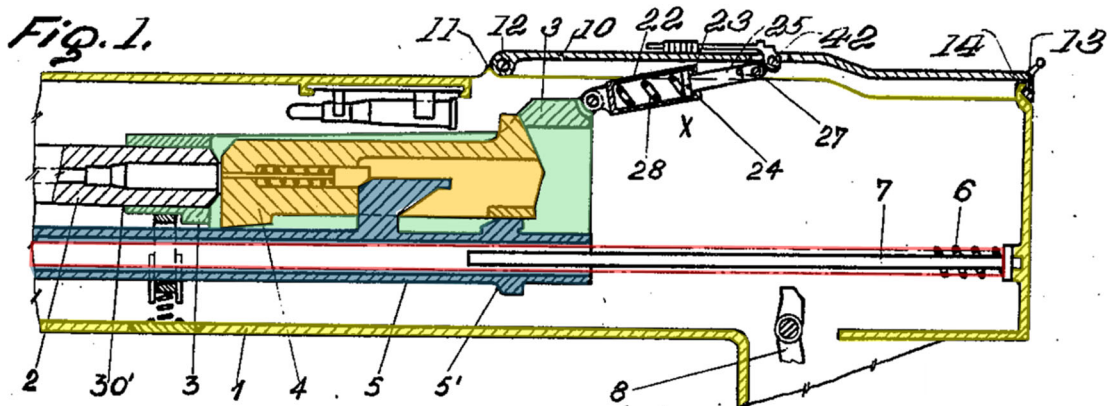
For ease of reference, the Challenged Claims are provided in a listing before the body of this with numbered claim limitations corresponding to the numbering used throughout.

V. OVERVIEW OF THE PRIOR ART

A. Holek

U.S. Patent No. 2,223,004 to Holek (EX1005, “Holek”) was filed February 8, 1938, and constitutes prior art to the ’238 patent under at least pre-AIA 35 U.S.C. § 102(a).

Holek discloses that it relates, in part, to “automatic firearms of the kind provided with recoiling barrels.” EX1005 at p.1, col.1, ll.1-3. Holek describes a machine gun with a movable barrel and barrel extension which are driven back by the recoil of the shot during operation and the operation of a gas accelerator. *Id.* at p.1, col.1, ll.35-40. Holek shows the design of the described machine gun in Fig. 1, which depicts the front of the machine gun on the left and the rear end of the weapon on the right.



Holek, Fig. 1 (annotated)

As can be seen in the annotated version of Fig. 1 of Holek, above, the automatic weapon disclosed in Holek has, in particular, a barrel 2 and a barrel

extension 3 (the latter highlighted in green, and which is described in Holek as “casing 3 of the breech mechanism”), both of which can move axially. *See, e.g.*, EX1005 at p.1, col.2, ll.26-29 (disclosing that barrel 2 “is rigidly connected with the casing 3” which are “movably mounted” relative to the receiver); *see also id.* at p.1, col.2, ll.44-47; *id.* at p.2, col.1, ll.10-24, 46-50, 65-75; *id.* at p.2, col.2, ll.1-6, 31-47. The weapon also has a receiver 1 (highlighted in light yellow), a bolt assembly 4 (highlighted in yellow, and which is described in Holek as “breech block”), an operating rod assembly 5 (highlighted in blue, and which is described in Holek as “breech block carrier”), and a drive spring 6 (rightmost portion outlined in red, and which is described in Holek as the “return spring”). EX1003 at ¶32, EX1005 at p.1, col.2, ll.26-43. Holek also discusses a piston provided in the front area of the operating rod assembly, which is driven to the rear by propellant gases and thus forms a gas accelerator. EX1003 at ¶32, EX1005 at p.1, col.2, ll.32-36.

Holek describes that the bolt assembly 4 (the “breech block”) is pushed forward within the barrel extension during the firing cycle by the operating rod assembly 5 (“breech block carrier”), which is driven by the drive spring 6 (“return spring”), until the bolt is secured to the barrel extension and the operating rod assembly moves forward faster relative to the bolt to release the shot by pushing the firing pin forward. EX1003 at ¶33, EX1005 at p.2, col.2, ll.36-41.

A POSITA would understand that Holek depicts only a partial drawing of drive spring 6 as depicted above (highlighted in red). Holek describes the drive spring 6 as being concentrically arranged around guide rod 7, which further extends into the space in the breech block carrier. EX1003 at ¶34, EX1005 at p.1, col.2, ll.36-41. This interpretation is further confirmed by the dashed lines surrounding the guide rod 7, as illustrated in Figs. 1-3, which appear to indicate the full length of drive spring 6.

This interpretation would also be most consistent with the understanding of a POSITA. If drive spring 6 were as short as the three windings illustrated in Fig. 1 of Holek, then the spring would be too short to touch the breech block carrier, even in the rightmost position of drive spring 6. EX1003 at ¶35, EX1005 at Fig. 1. A POSITA would understand that the guide rod 7 keeps drive spring 6 in place when it is not in the space of the breech block carrier. EX1003 at ¶35, EX1005 at Fig. 1. On the other hand, when the drive spring 6 is located inside the breech block carrier, it is guided (i.e., kept straight) by the boundaries of the space defined by the breech block carrier. EX1003 at ¶35, EX1005 at Fig. 1.

Holek was not considered during prosecution of the '238 patent. *See generally* EX1002. A POSITA would not consider Holek to be cumulative of Rossier nor other references cited during prosecution of the '238 Patent. EX1003 at ¶33.

B. Rossier

U.S. Patent No. 6,343,536 to Rossier (EX1006, “Rossier”) was filed November 11, 1999, and constitutes prior art to the ’238 patent under at least pre-AIA 35 U.S.C. § 102(a).

Rossier describes a method and device for absorbing the recoil force, or energy, of an automatic weapon. EX1006 at 1:5-8. Rossier discloses a tactical advantage in providing a lightweight weapon with a long range because, at that time, only large-caliber automatic weapons then available could be used over a long range of up to 2,000 meters, but these weapons were too heavy and bulky to be easily portable. *Id.* at 1:9-18. On the other hand, smaller and more easily portable weapons at that time did not have a long range. *Id.* at 18-21. Rossier disclosed that accuracy of weapons at long range depended upon the ability to manage the recoil force of a fired projectile. *Id.* at 1:22-24.

Rossier was cited by the examiner during prosecution of the ’238 patent. The Board should consider Rossier in the present proceeding for at least two reasons. First, during prosecution, the applicant argued that Rossier did not disclose “the op-rod assembly and the bolt assembly [being] locked to the barrel extension during the firing condition.” EX1002 at 171. However, as shown herein, Rossier describes a rotating bolt, which is rotated by the axial displacement, and closes the firing chamber before the shot is fired, thereby locking the op-rod

assembly and the bolt assembly to the barrel extension during the firing condition.

EX1006 at 5:31-46. By not considering this teaching in Rossier, the examiner

“erred in a manner material to the patentability of the challenged claims.”

Medacta USA, Inc. v. RSB Spine, LLC, IPR2020-00264, Paper 24 at 16 (PTAB

May 22, 2020). Second, because Rossier was distinguished only on the basis of

the addition of this one additional limitation in independent claim 13, Rossier

should be considered for purposes of showing invalidity of other claim limitations,

including the other limitations of claim 13, the limitations of claim 1, and the

limitations in the dependent claims.

C. Chinn

Chinn is a printed publication titled *The Machine Gun*, Volume 5, that was

published no later than December 31, 1987, and constitutes prior art to the '238

patent under at least pre-AIA 35 U.S.C. § 102(b). Specifically, on its face, Chinn

is dated 1987. EX1007 at 5. *See Hulu v. Sound View Innovations, LLC*, IPR2018-

01039, Paper 29, at 9 (PTAB Dec. 20, 2019) (precedential). In addition, expert

testimony establishes that Chinn had been received, indexed, and cataloged by

subject matter in multiple ways around or shortly after December 31, 1987.

EX1008; *see also Samsung Elecs. Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1369

(Fed. Cir. 2019). Therefore, Chinn is prior art under at least pre-AIA 35 U.S.C. §

102(b).

Chinn contains detailed descriptions of most of the machine guns and technically related automatic weapons known at the time. In particular, Chinn describes in Chapter 25 the automatic M60 machine gun and describes its technical functionality. EX1007 at 271-277.

VI. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art, at the time the '238 patent was filed, would have had at least an undergraduate degree in mechanical engineering or a closely related engineering or scientific field, or alternatively similar advanced post-graduate education, and at least two years of experience in the development and design of small arms, in particular in the field of automatic small arms. EX1003, ¶40. Less work experience may be compensated by a higher level of education or vice versa. *Id.* Petitioners' expert, Dr. John Nixon, met and exceeded this definition at the time the '238 patent was filed, and has offered opinions from the perspective of a POSITA. *Id.*

VII. CLAIM CONSTRUCTION

Petitioners have applied the ordinary and customary meaning of the claim terms as they would have been understood by a POSITA at the time of the alleged invention, in the context of the '238 patent and its prosecution history. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). Petitioners do not believe

any term needs to be expressly construed beyond its plain and ordinary meaning.

EX1003, ¶41.

VIII. DETAILED EXPLANATION OF INVALIDITY GROUNDS

The following grounds establish a reasonable likelihood that the Petitioners will prevail with respect to the Challenged Claims. EX1003, ¶¶43-164.

A. GROUND 1: CLAIMS 1, 5-7, 13, AND 14 OF THE '238 PATENT ARE ANTICIPATED BY HOLEK

For at least the reasons below, claims 1, 5-7, 13, and 14 of the '238 patent are invalid as anticipated by Holek.

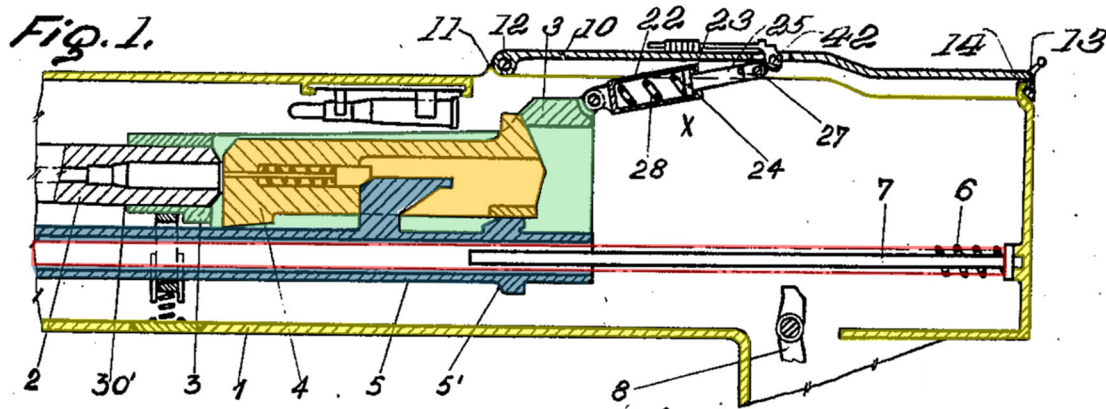
1. Claim 1

a) [1.P]: “A weapon system for firing a round, comprising:”

To the extent the preamble is limiting, Holek discloses this limitation. Holek discloses that it “relates to automatic firearms and more particularly to automatic firearms of the kind provided with recoiling barrels” EX1005, p.1, col.1, ll.1-3; EX1003, ¶44. Figure 2 of Holek further depicts a weapon system for firing a round. EX1003, ¶44.

b) [1.1]: “a receiver;”

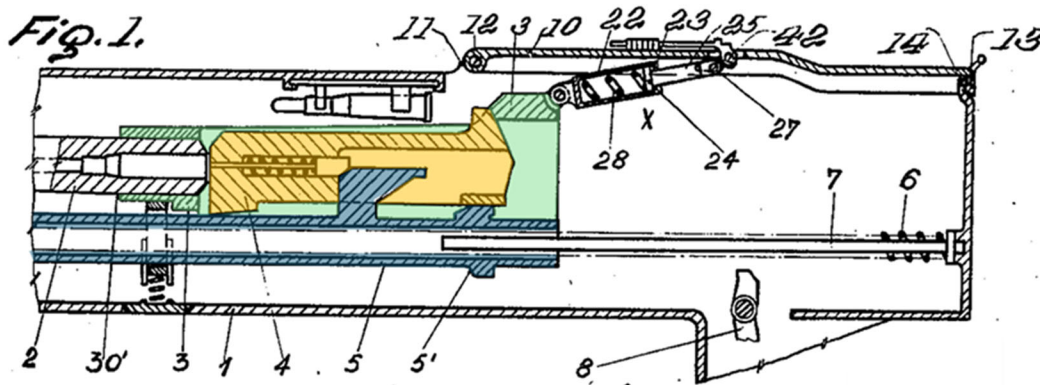
Holek discloses this limitation. EX1003, ¶45. As shown in Fig. 1 of Holek, Holek describes a “firearm casing” and “casing 1” which is the receiver (highlighted in light yellow in the annotated Fig. 1) below.



Holek, Fig. 1 (annotated)

- c) [1.2]: “an operating group configured to operate the weapon system through a charged condition, a firing condition, and a recoil condition, the operating group comprising”

Holek discloses this limitation. EX1003, ¶46. As shown in Fig. 1 of Holek, Holek describes an operating group comprising: a “casing 3 of the breech mechanism” which is a barrel and a barrel extension (the latter highlighted in green in the annotated Fig. 1 below); both of which can move axially; a “breech block carrier” which is the operating rod assembly (highlighted in blue in the annotated Fig. 1 below); and a “breech block” which is the bolt assembly (highlighted in yellow in the annotated Fig. 1 below). Together, these form the recited operating group. EX1003, ¶46; EX1005, Fig. 1.

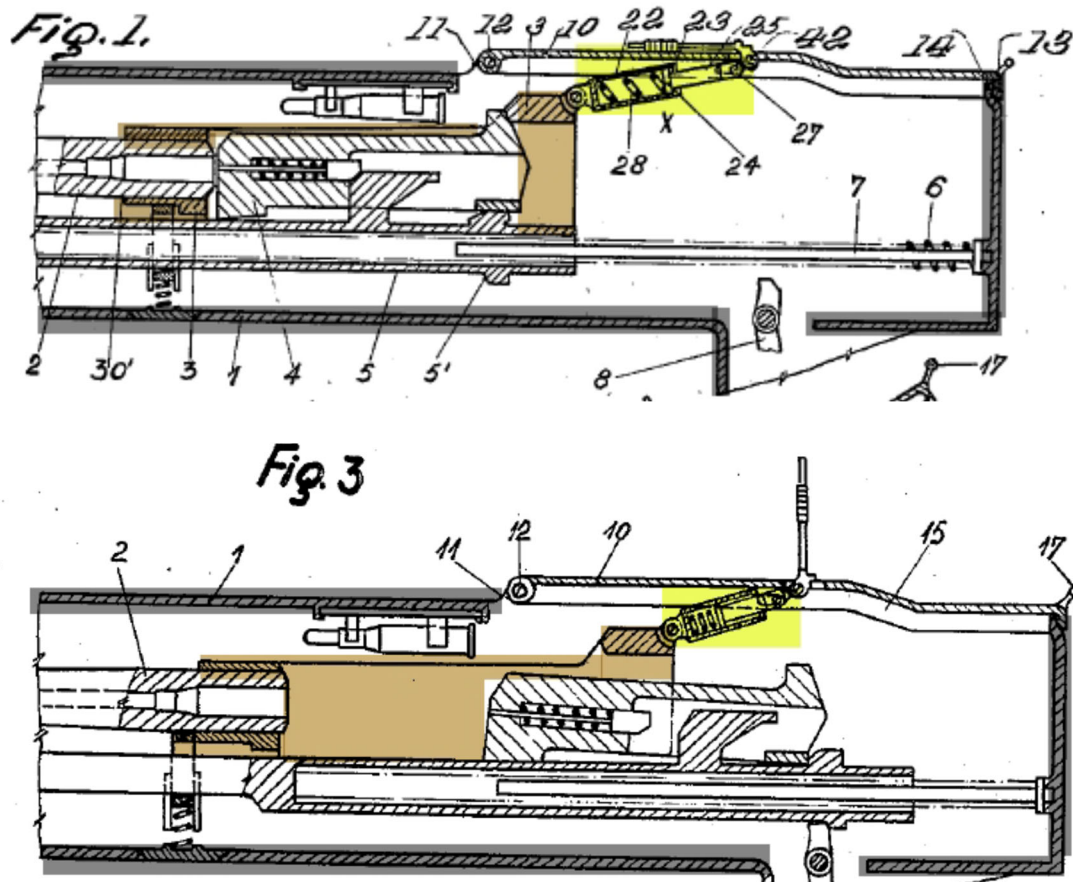


Holek, Fig. 1 (annotated)

- (1) [1.2a]: “a barrel extension at least partially housed within the receiver and arranged to axially translate relative to the receiver;”

Holek discloses this limitation. The barrel extension of Holek (referenced as “casing of the breech mechanism” as described above) is configured to move relatively axially within the receptacle between the various operating states (charged, firing, recoiling) as further illustrated in the different positions of the barrel extension (highlighted in brown below) in relation to the receptacle as shown in Figures 1-3. EX1003, ¶47; EX1005 at Figs. 1-3. Further, the barrel extension is housed within the receiver (highlighted in gray below). EX1003, ¶47; EX1005 at Figs. 1, 3. Holek states, “Referring to the drawing, 1 denotes the firearm casing in which the barrel 2, which is rigidly connected with the casing 3 of the breech mechanism, is movably mounted.” EX1003, ¶47; EX1005 at p.1, col.2, ll.25-29 (emphasis added). Since the barrel is rigidly connected with the casing of the breech mechanism, and since the barrel is movably mounted in the

firearm casing, the casing of the breech mechanism is also movably mounted in the firearm casing. EX1003, ¶44; *see also* EX1005, Figs. 1-3.

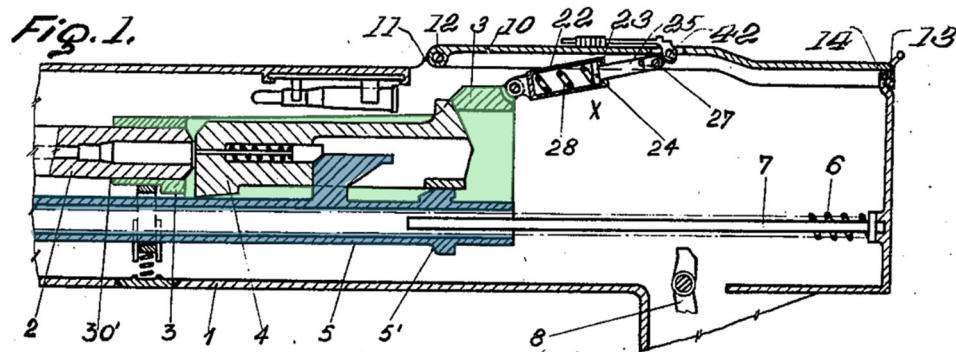


Holek, Figs. 1, 3 (annotated)

- (2) [1.2b]: “an operating rod (op-rod) assembly at least partially housed and arranged to axially translate within the barrel extension in the charge condition, the firing condition, and the recoil condition; and”

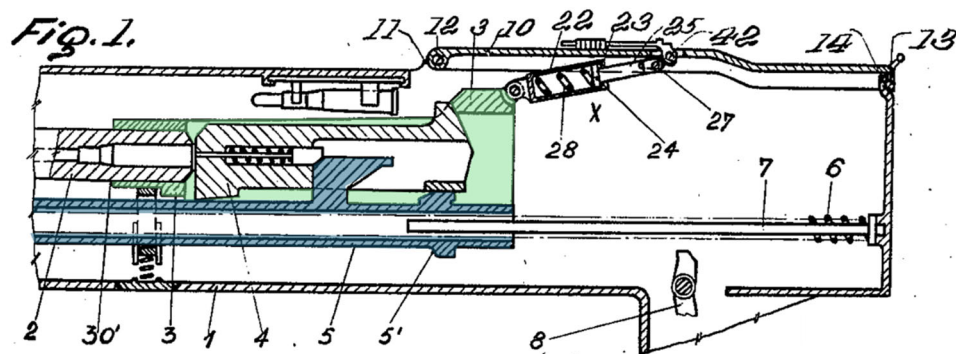
Holek discloses this limitation. The operating rod assembly of Holek (referenced as the “breech-block carrier” described above, highlighted in blue in Fig 1, below) is configured to move axially within the barrel extension (highlighted

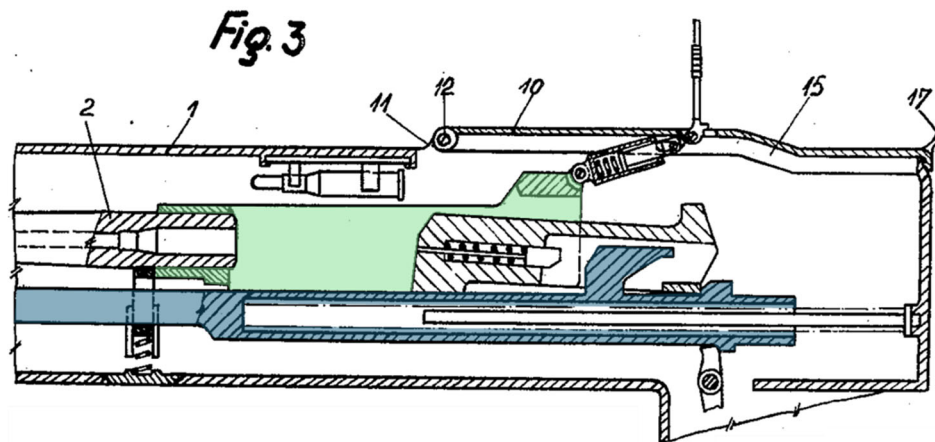
in green) between the various operating states (loaded, firing, recoiling) as further illustrated in Figures 1-3. EX1003, ¶48; EX1005 at Figs. 1-3.



Holek, Fig. 1 (annotated)

The axial movement of this operating rod assembly (blue) within the barrel extension (green) can be seen from a comparison of Figures 1 (initial state) and 3 (firing state). EX1003, ¶49; EX1005 at Figs. 1, 3. It is shown there that the upwardly projecting element of the operating rod assembly moves within the barrel extension:



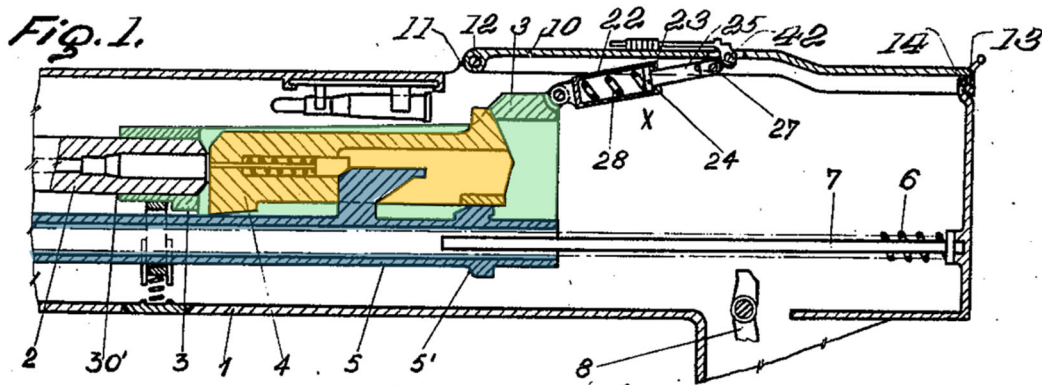


Holek, Figs. 1, 3 (annotated)

Further description of the charge condition, the firing condition, and the recoil condition is provided above. *Supra* at VIII.A.1.c.

- (3) [1.2c]: “a bolt assembly coupled to the op-rod assembly and at least partially housed and arranged to axially translate within the barrel extension;”

Holek discloses this limitation. Holek discloses a bolt assembly (shown below in Figure 1, highlighted in yellow), which is connected to the operating rod assembly and which is housed at least partially within the barrel extension and is axially movable therein:

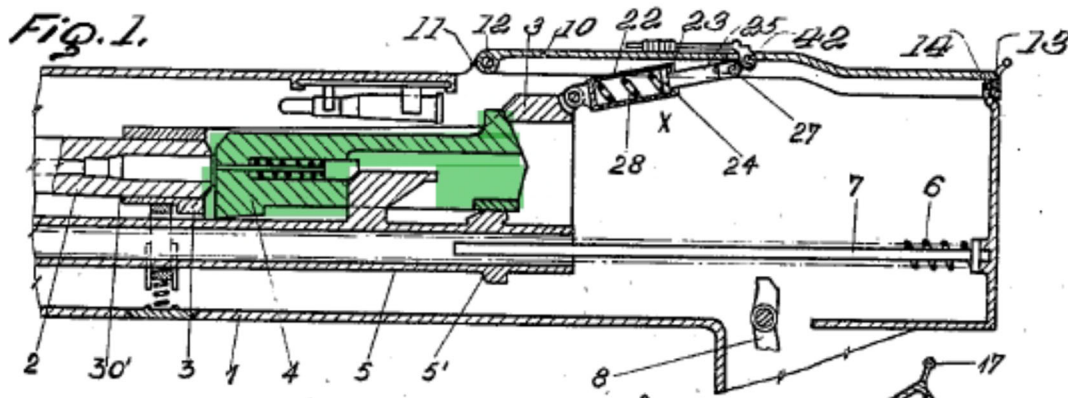


Holek, Fig. 1 (annotated)

EX1003, ¶51; EX1005 at Fig. 1. That this bolt assembly is movably arranged axially within the barrel extension is further explained in Holek. EX1003, ¶51; EX1005 at p.2, col.2, ll.31-45.

d) [1.3]: “a barrel coupled to the barrel extension and defining a chamber;”

Holek discloses this limitation. Holek depicts and describes a “barrel 2” connected to a barrel extension (highlighted in green, described in Holek as the “casing of the breech mechanism” and “casing 3”). EX1003, ¶52; EX1005 at p.1, col.2, ll.26-29.



Holek, Fig. 1 (annotated)

- e) [1.4]: “a gas accelerator with a first end coupled to the barrel and a second end coupled to the op-rod assembly; and”

Holek discloses this limitation. Holek describes a gas accelerator which is connected at one end to the barrel and at the other end to the operating rod (op-rod) assembly. EX1003, ¶53; EX1005 at p.1, col.2, ll.32-40. More specifically, Holek states:

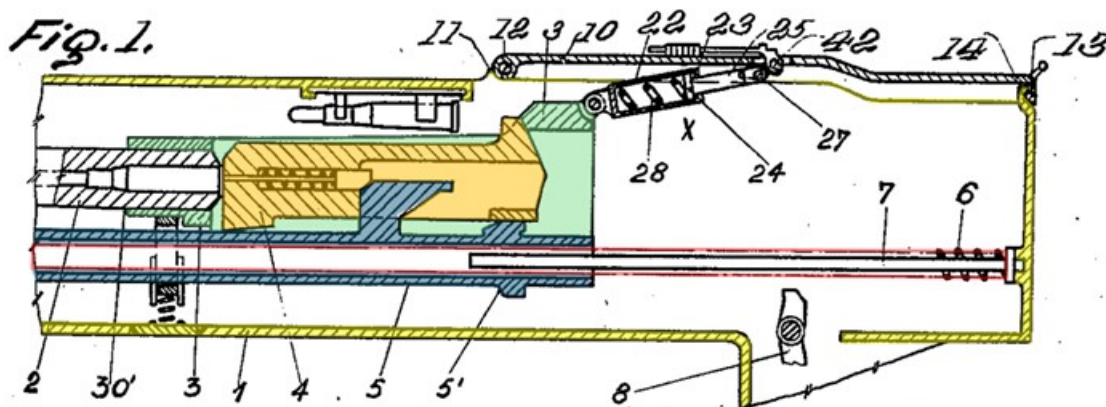
The breech mechanism includes a swinging breech block 4 which is operated and controlled by a breech-block carrier 5. The said carrier is extended forward in the form of *a rod having a piston* adapted to be acted upon in known manner *within a cylinder to which the exhaust gases pass from the barrel after firing*. The breech-block carrier 5 is loaded by a return spring 6 which rests against the back wall of the casing 1 or against a collar on a guiding rod 7 which is fixed in the casing and around which the return spring is concentrically arranged.

EX1005 at p.1, col.2, ll.29-40 (emphasis added). This passage describes the gas accelerator as receiving gases from the barrel, and the description of the rod having

a piston is consistent with Fig. 1, disclosing guiding rod 7 as being connected to the op-rod assembly, as well as this description. EX1003, ¶53.

- f) [1.5]: “a buffer assembly comprising a drive spring having a first end coupled to the receiver and a second end coupled to the op-rod assembly,”

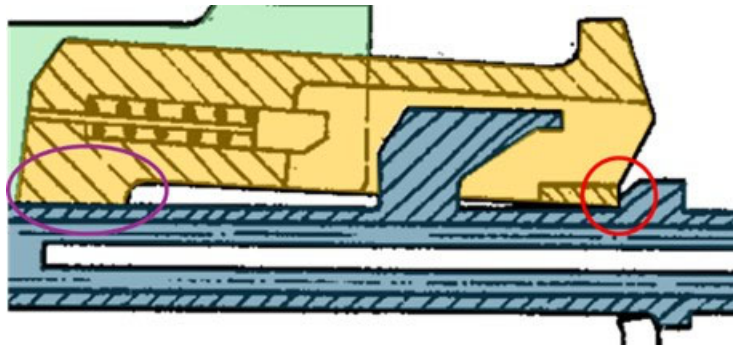
Holek discloses this limitation. Fig. 1 depicts a buffer assembly (highlighted in red) which includes a drive spring (“return spring 6”). The buffer assembly is connected to the receiver (casing 1) and is connected to the op-rod assembly (7). As described above, Holek provides only a partial drawing of drive spring 6, which a POSITA would understand to extend further. *Supra* at V.A; EX1003, ¶¶54, 34-35. In addition to the drive spring, Holek also discloses a second buffer assembly in “spring 28” which controls the forward and backward movement of the barrel extension and is therefore also a buffer assembly. EX1003, ¶54; EX1005 at Fig. 1; p.2, col.1, ll.25-31; p.2, col.2, ll.36-41.



Holek, Fig. 1 (annotated)

- g) [1.6]: “wherein, in the charged condition, the op-rod assembly and the bolt assembly are retracted against the drive spring;”

Holek discloses this limitation. In the annotated excerpt of Figure 3 of Holek, provided below, the op-rod assembly (blue) and the bolt assembly (orange) are retracted against the drive spring (“return spring 6”) in the charged condition. The bolt assembly is secured (red circle) by the backward tilted position of the bolt on a projection of the op-rod assembly. As specifically described in Holek, “[b]efore firing is commenced, the breech mechanism is first cocked against the action of the return spring 6 by means of a cocking device which is not shown.” EX1003, ¶55; EX1005 at Fig. 1 and p.2, col.2, ll.48-58.

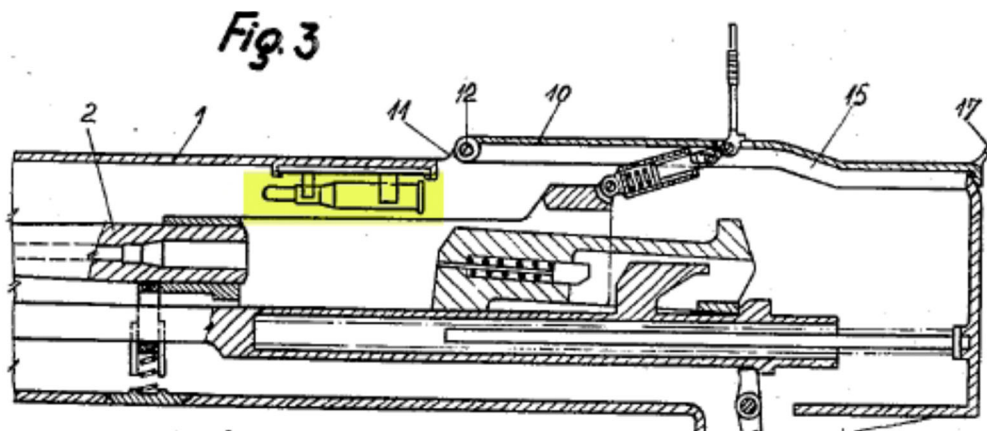


Holek, Fig. 3 (excerpt, annotated)

- h) [1.7a]: “wherein, in the firing condition, the op-rod assembly and bolt assembly are driven by the drive spring such that the round is guided into the chamber and the op-rod assembly and bolt assembly are locked to the barrel extension and a forward momentum of

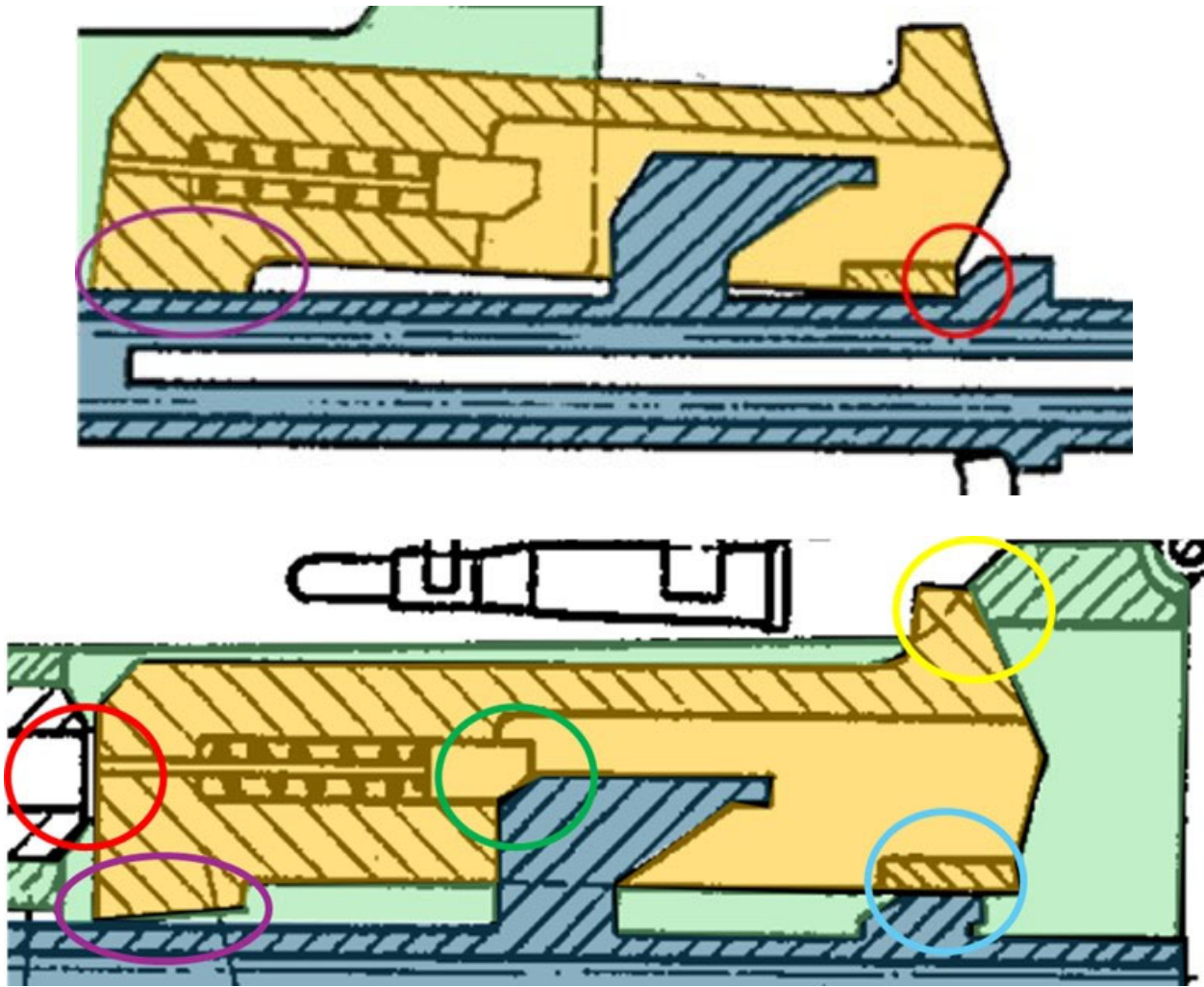
the op-rod assembly is imparted to the operating group and the round is fired,”

Holek discloses this limitation. The op-rod assembly (“breech-block carrier”) described in Holek is driven forward with the bolt (“breech block”) by the kinetic energy stored in the drive spring (“return spring 6”), whereby this movement also loads a cartridge into the firing chamber. EX1003, ¶56; EX1005 at p.2, col.2, ll.31-35. The fact that a round is loaded into the firing chamber by this process is also depicted, for example, in the annotated Figure 3 below (with the round highlighted in light yellow).



Holek, Fig. 3 (annotated)

When the bolt assembly (“breech block”) strikes the rear end of the barrel, a release between the bolt assembly and the op-rod assembly is depicted in a comparison of Figs. 1 and 3 of Holek, as shown below.



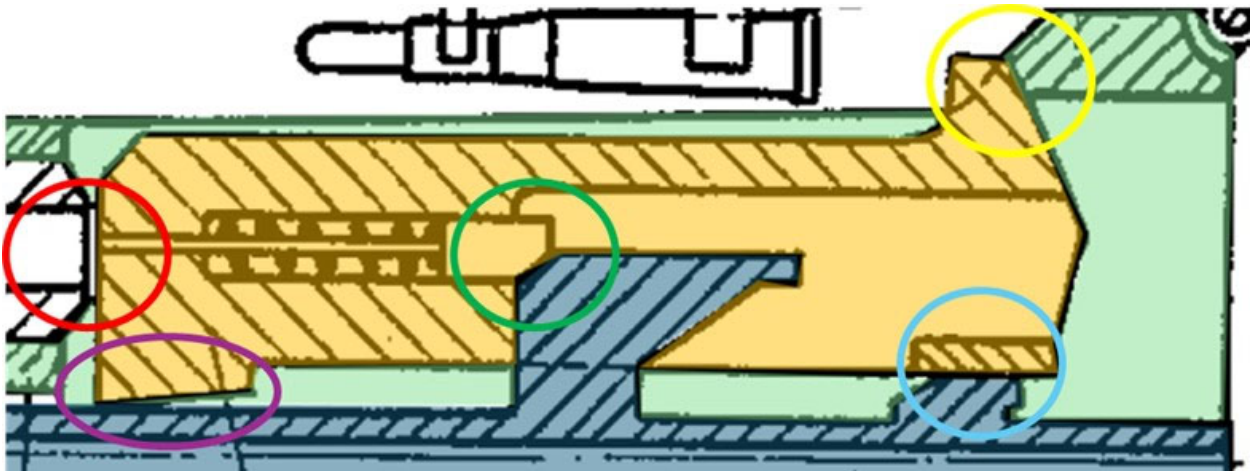
Holek, Figs. 3, 1 (annotated)

EX1003, ¶57; EX1005 at Figs. 1, 3.

As depicted in Figs. 3 and 1 of Holek, the bolt, which is initially secured to a projection of the op-rod assembly by the relatively backwards position (Figure 3, red arrow, above), moves forwards from this position until it hits the rear end of the barrel, whereby the bolt is released from the op-rod assembly and the op-rod assembly is then moved forwards relative to the bolt (Figure 1). The fact that this

results in a release—that is, a relative movement—can also be seen from the upper (projecting) part of the op-rod assembly, which moves inside the bolt up to its front end. EX1003, ¶58; EX1005 at Figs. 1, 3.

Fig. 1 also shows the securing of the bolt (yellow) and the op-rod assembly (blue) on the barrel extension (green), depicted below. EX1003, ¶59; EX1005 at Figs. 1, 3.

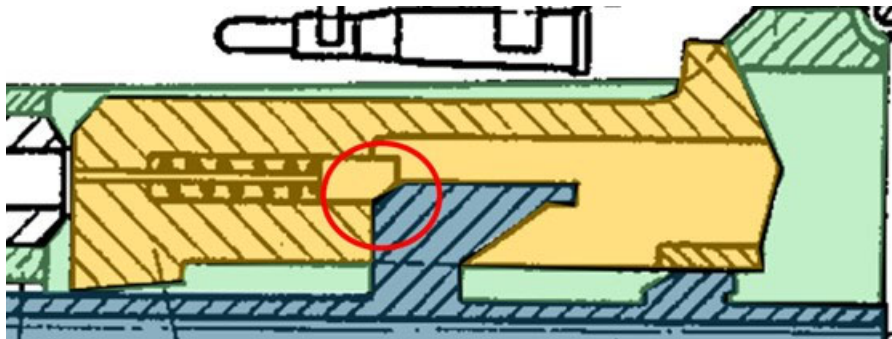


Holek, Fig. 1 (excerpt, annotated)

When the rear part of the bolt is raised, it engages with the barrel extension (yellow circle, above). The operating rod assembly is thus secured to the barrel extension via the bolt. EX1003, ¶60; EX1005 at Fig. 1.

As is also depicted in Holek, Fig. 1, the bolt assembly is secured to the barrel extension. Because there is no longer any relative movement between them, the propulsion of the op-rod assembly, which has a higher forward speed than the rest of the operating group, is passed on to the entire operating group. The fact that

the shot is also triggered when the forward movement is passed on by the op-rod assembly is also shown in Fig. 1. As depicted below in annotated Holec, Fig. 1, the op-rod assembly (blue) pushes the firing pin (see red circle) forward to discharge the shot. EX1003, ¶61; EX1005 at Fig. 1.



Holec, Fig. 1 (excerpt, annotated)

- i) **[1.7b]: “wherein a portion of an impulse of the fired round stops the forward momentum of the operating group; and”**

Holec discloses this limitation. Holec also discloses that the propulsion of the “breech block carrier” is transferred to the operating group and the shot is thereby fired. The operating group itself is still undergoing propulsion at the time of firing (“during this forward movement, firing takes place”), which is then stopped by a portion of the impulse of the fired round “without reaching the foremost fixed stops.” EX1003, ¶62; EX1005, p.2, col.2, ll.31-51.

- j) **[1.8]: “wherein, in the recoil condition, the operating group is driven rearward by the remaining portion of the impulse of the fired round, the gas accelerator imparts additional rearward momentum to the op-**

rod assembly and bolt assembly and stops rearward momentum of the barrel and barrel extension, and the op-rod assembly and the bolt assembly are stopped by the drive spring.”

Holek discloses this limitation. Holek describes that the impulse from recoil remaining after stopping the propulsion is strong enough to open the breech mechanism. EX1003, ¶63; EX1005, p.2, col.2, ll.48-52. Holek also describes that the recoil energy is accumulated in spring 28. EX1003, ¶63; EX1005, p.2, col.2, ll.48-58.

Holek also discloses that additional recoil is transmitted via the gas accelerator to the op-rod assembly and the bolt assembly, which simultaneously stops the recoil of the barrel and barrel extension, utilizing “the exhaust gases [that] pass from the barrel after firing.” EX1003, ¶64; EX1005, p.1, col.2, ll.29-36. The pressure generated in the gas cylinder drives the breech-block carrier backwards on the one hand and causes an opposing, forward-acting force on the other, which acts on the barrel and the barrel extension connected to the barrel due to the fixed connection between the gas cylinder and the barrel, thus stopping the backward movement of the barrel and barrel extension. EX1003, ¶64; EX1005, p.1, col.2, ll.29-36.

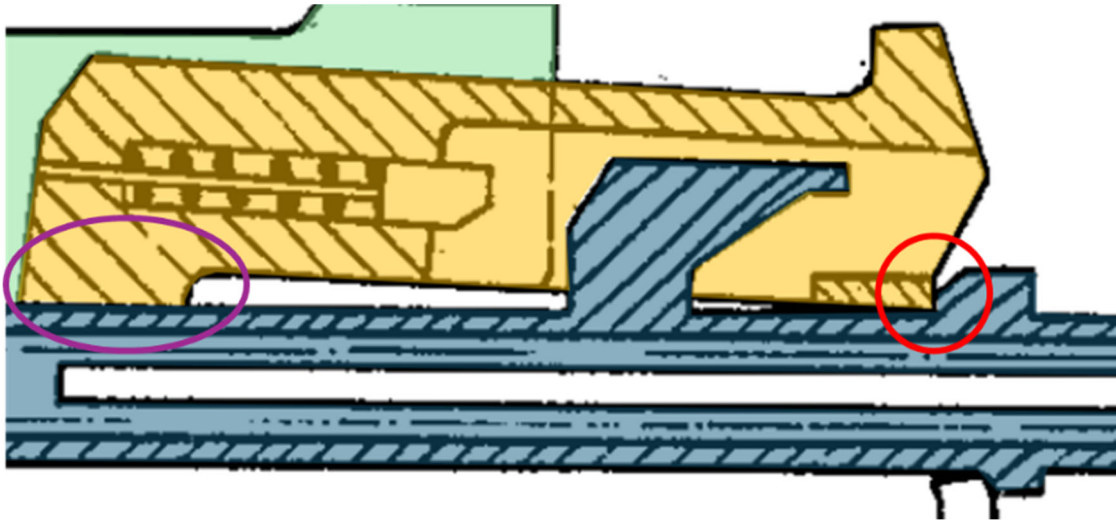
Holek also discloses the stopping of the return drive of the op-rod assembly and the bolt assembly by the drive spring (“return spring 6”), whereby the “breech-

block carrier 5 [op-rod assembly] is loaded by [the] return spring 6” (to return to the charged condition). EX1003, ¶65; EX1005, p.1, col.2, ll.36-40.

2. Claim 5: The weapon system of claim 1, further comprising a lock assembly configured to secure the bolt assembly to the op-rod assembly in the charged condition through chambering the round.

In an interpretation of claim 5 wherein the system is in the charged condition until the round is chambered, the bolt assembly is secured to the op-rod assembly (i.e., during this time these two components will move in unity), Claim 5 is thereby also disclosed by Holek in a similar manner.

Namely, it can be seen from the below zoomed-in snippet of Figure 3 of Holek, below (annotated) that the breech block 4 (yellow) is locked to the breech-block carrier 5 (blue) because of the upwards protrusion at the backside of the breech-block carrier which the breech block presses against (see red circle). The slanted position of the breech block is caused by the corresponding slope of the lower end of the downward protrusion at the frontside of the breech block (see purple ellipse). Due to the slanted position, the breech block stays in this locked position. EX1003, ¶67; EX1005, Fig. 3.



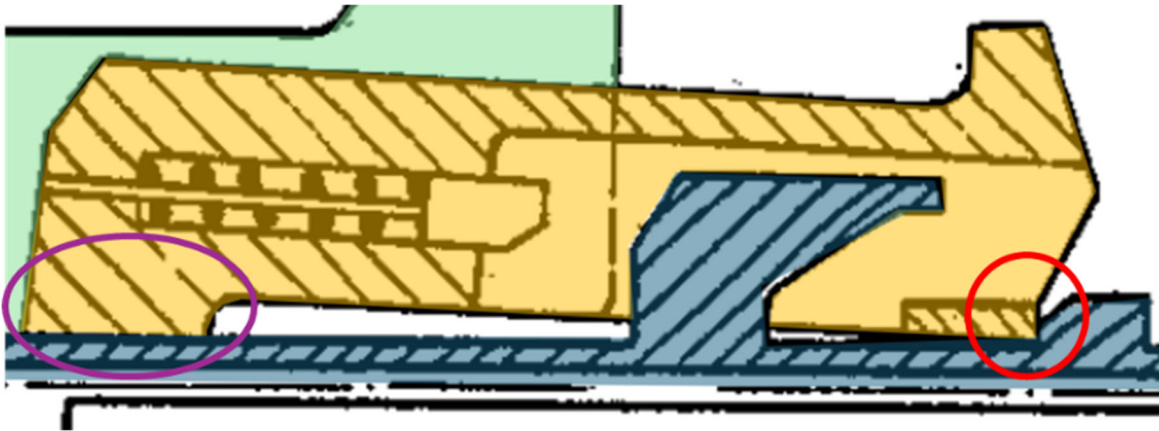
Holek, Fig. 3 (excerpt, annotated)

3. **Claim 6: The weapon system of claim 5, wherein the lock assembly is configured to release the bolt assembly from the op-rod assembly in the firing condition.**

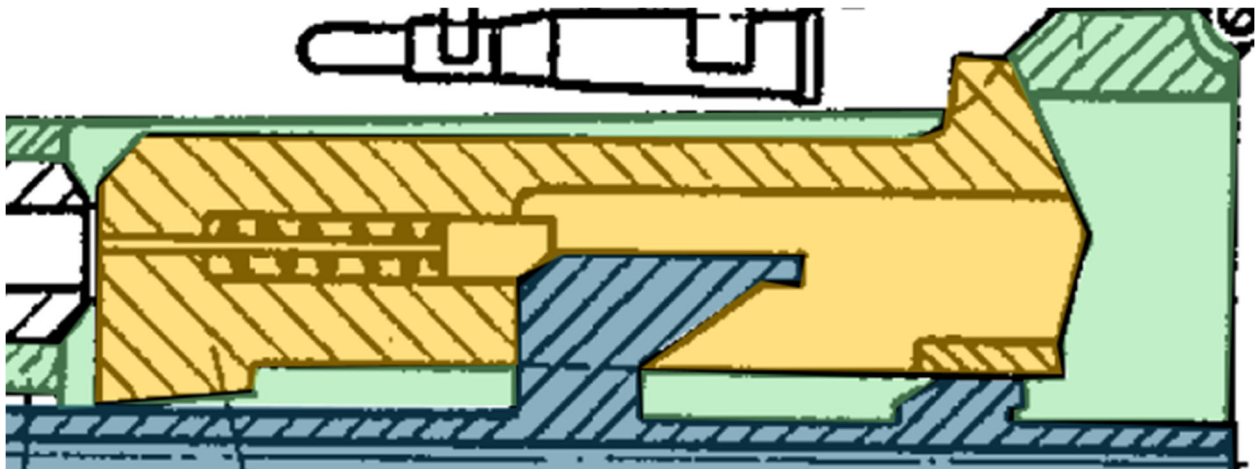
As can be seen by comparing the below snippets of Figure 3 and Figure 1, the breech block is released from the breech-block carrier since it can move with respect to the breech-block carrier. The lock assembly is highlighted in purple and red in the Figure 3 snippet, below. When the breech block hits the barrel, the backside of the breech block is lifted. It can be seen in the two snippets of Figures 3 and 1 below that this lift frees the breech-block carrier to move forward. In the top figure, Figure 3, the breech-block carrier cannot pass the rear end of the breech block (red circle). In the lower figure, the rear end of the breech block is lifted and the breech-block carrier can pass underneath. EX1003, ¶68; EX1005, Figs. 1, 3.

Namely, it can be seen from the below zoomed-in snippet of Figure 3 of Holek, below (annotated) that the breech block 4 (yellow) is locked to the breech-

block carrier 5 (blue) because of the upwards protrusion at the backside of the breech-block carrier which the breech block presses against (see red circle). The slanted position of the breech block is caused by the corresponding slope of the lower end of the downward protrusion at the frontside of the breech block (see purple ellipse). Due to the slanted position, the breech block stays in this locked position. EX1003, ¶69; EX1005, Fig. 3.



Holek, Fig. 3 (excerpt, annotated)

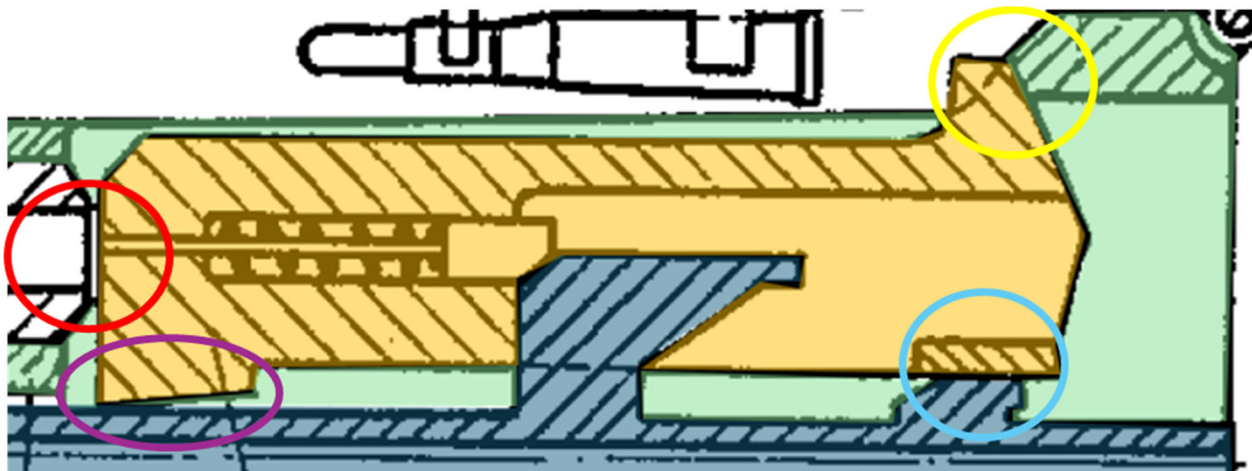


Holek, Fig. 1 (excerpt, annotated)

4. **Claim 7: The weapon system of claim 5, wherein the lock assembly is configured to release the bolt assembly from the op-rod assembly in the firing condition.**

Holek discloses this limitation. Holek states, “During this forward movement, *firing takes place with the breech block locked* and the energy of the parts which are moving forward overcomes the energy of the recoil resulting from the firing.” EX1003, ¶70; EX1005 at p.2, col.2, ll.42-47 (emphasis added).

As shown in Fig 1 of Holek, when the breech block hits the barrel, it will rotate around its front protrusion (below in the purple ellipse) so that its front face is abutting the beginning of the barrel (below red circle). This rotation lifts the backside of the breech lock out of the locked position with the breech-block carrier and into a locked position with the casing (below yellow circle). The breech-block carrier continues sliding forward, with its backward protrusion (in the light blue circle) keeping the breech block lifted and thus locked against the back side of the casing (yellow circle). EX1003, ¶71; EX1005 at Fig. 1.



Holek, Fig. 1 (excerpt, annotated)

At this moment, the breech mechanism is positioned within the casing as shown in Figure 1 of Holek. The breech block [bolt assembly] is now locked to the casing 3 [barrel extension], as indicated (see yellow, light blue, purple and red circles in annotated Fig. 1, above). EX1003, ¶72.

5. Claim 13:

a) [13.P]: “A method for firing a weapon, comprising:”

To the extent the preamble is limiting, Holek discloses this limitation. EX1003, ¶73. As discussed above, Holek discloses “A weapon system for firing a round.” *Supra* at VIII.A.1.a. Holek discloses this limitation for the same reasons.

b) [13.1]: “retracting a bolt assembly and an operating rod (op-rod) assembly relative to a barrel extension against a drive spring;”

Holek discloses this limitation. EX1003, ¶74. As discussed above, Holek discloses “an operating rod (op-rod) assembly.” *Supra* at VIII.A.1.c.2. As discussed above, Holek discloses “a bolt assembly.” *Supra* at VIII.A.1.c.3. As discussed above, Holek discloses that, in the charged condition, “the op-rod assembly and the bolt assembly are retracted against the drive spring.” *Supra* at VIII.A.1.g. Holek discloses this limitation for the same reasons.

c) [13.2]: “driving the bolt assembly and the op-rod assembly with a forward momentum within the barrel extension such that the bolt assembly chambers a round and contacts the barrel extension, imparting

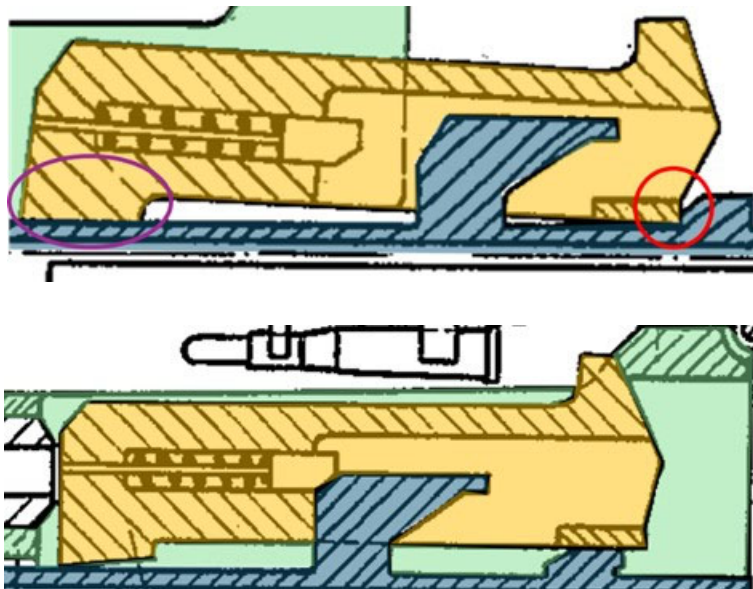
forward momentum to the op-rod assembly, the bolt assembly and the barrel extension such that the round is fired, whereby the firing of the round stops the forward momentum and imparts an impulse of rearward momentum on the op-rod assembly, the bolt assembly, and the barrel extension,”

Holek discloses this limitation. EX1003, ¶75. As discussed above, Holek discloses that, in the firing condition, “the op-rod assembly and bolt assembly are driven by the drive spring such that the round is guided into the chamber and the op-rod assembly and bolt assembly are locked to the barrel extension and a forward momentum of the op-rod assembly is imparted to the operating group and the round is fired, wherein a portion of an impulse of the fired round stops the forward momentum of the operating group.” *Supra* at VIII.A.1.h-i. As also discussed above, the operating group comprises a barrel extension, an op-rod assembly, and a bolt assembly. *Supra* at VIII.A.1.c. Holek discloses this limitation for the same reasons.

- d) **[13.3]: “wherein the driving step includes securing the bolt assembly to the op-rod assembly in the charged condition until the bolt assembly engages the barrel extension, wherein the driving step includes releasing the bolt assembly from the op-rod assembly when the bolt assembly engages the barrel extension, wherein the driving step includes securing the bolt**

**assembly to the barrel extension during the contact
with the barrel extension;”**

Holek discloses this limitation. EX1003, ¶73. In the firing condition (*see supra* at VIII.A.1.h), when the bolt assembly (“breech block”) strikes the front end of the barrel extension, a release between the bolt assembly and the op-rod assembly is depicted in a comparison of Figs. 1 and 3 of Holek, as shown below.



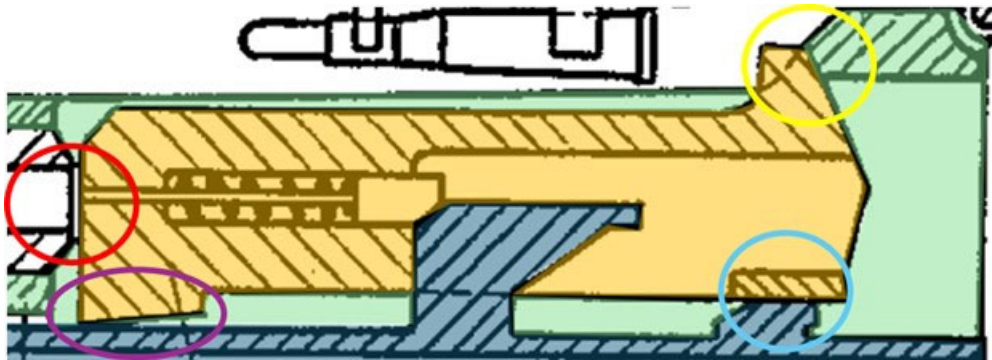
Holek, Figs. 3, 1 (excerpts, annotated)

EX1003, ¶76; EX1005 at Figs. 1, 3.

As depicted in Figs. 3 and 1 of Holek, the bolt, which is initially secured to a projection of the op-rod assembly by the relatively backwards position (Figure 3, red circle, above), moves forwards from this position after it hits the end of the barrel extension, whereby the bolt is released from the op-rod assembly and the op-rod assembly is then moved forwards relative to the bolt (Figure 1). The fact that

this results in a release—that is, a relative movement—can also be seen from the upper (projecting) part of the op-rod assembly, which moves inside the bolt up to its front end. EX1003, ¶77; EX1005 at Figs. 1, 3.

Fig. 1 also shows the securing of the bolt (yellow) and the op-rod assembly (blue) on the barrel extension (green), depicted below. EX1003, ¶78; EX1005 at Figs. 1, 3.



Holek, Fig. 1 (excerpt, annotated)

When the rear part of the bolt is raised, it engages with the barrel extension (yellow circle, above). The operating rod assembly is thus secured to the barrel extension via the bolt. EX1003, ¶79; EX1005 at Fig. 1.

- e) **[13.4]: “guiding gases from the round with a gas accelerator to drive the op-rod assembly rearward and to stop the rearward momentum of the barrel extension; and”**

Holek discloses this limitation. EX1003, ¶80. As discussed above, Holek discloses that, in the recoil condition, “the gas accelerator imparts additional rearward momentum to the op-rod assembly and bolt assembly and stops rearward

momentum of the barrel and barrel extension, and the op-rod assembly and the bolt assembly are stopped by the drive spring.” *Supra* at VIII.A.1.i. As also discussed above, the gas accelerator stops the recoil of the barrel and barrel extension, utilizing “the exhaust gases [that] pass from the barrel after firing.” *Id.* (citing EX1003, ¶80; EX1005, p.1, col.2, ll.29-36). Holek therefore discloses this limitation for the same reasons.

f) [13.5]: “absorbing the rearward momentum of the op-rod assembly with the drive spring.”

Holek discloses this limitation. EX1003, ¶81. As discussed above, Holek also discloses the stopping of the return drive of the op-rod assembly and the bolt assembly by the “return spring.” *Supra* at VIII.A.1.i (citing EX1003, ¶81; EX1005, p.1, col.2, ll.36-40). Holek therefore discloses this limitation for the same reasons.

6. Claim 14: The method of claim 13, wherein the driving step includes driving the bolt assembly and the op-rod assembly with the forward momentum that is approximately one-third to one-half of the impulse of the round.

The limitation added in dependent claim 14 recites an arbitrary design decision regarding the portion of forward momentum transferred to the op-rod assembly and the bolt assembly with respect to the total impulse of the round. Further, the '238 patent does not disclose any benefit or advantage realized from the transfer of forward momentum compared to the impulse of the round of this

ration range compared to ratios outside this range. As such, this limitation is disclosed or is rendered obvious by Holec or by Holec in view of the knowledge of a POSITA. EX1003, ¶82; EX1001, 11:9-13.

Additionally, Holec discloses limitations on the momentum of the bolt assembly as compared to the impulse of the round. EX1005 at p.2, col.2, ll.45-58. In particular, a POSITA would understand that the impulse of the fired round would be approximately twice the magnitude of the momentum of the bolt and op-rod before firing by Holec reciting that “Although the recoil energy, [] is considerably smaller owing to the action of the energy imparted in the forward movement, is [] sufficient to open the breech mechanism, it is not great enough to produce harmful blows... it is so small that the comparatively weak spring 28 of the device [] is sufficient for the accumulation of energy and for braking the components that recoil back.” EX1003, ¶80; EX1005 at p.2, col.2, ll.45-58. A POSITA would understand an upper limit of one-half the impulse of the round because this description is consistent with the momentum of the bolt and op-rod assemblies being between one-half to one-third the impulse of the round. EX1003, ¶83.

Further, this portion of Holec also discloses that the weak spring 8 is compressed so as to prevent “harmful blows.” EX1005 at p.2, col.2, ll.45-58. The ratio would therefore depend on the strength of the weak spring in order to

determine whether this means that the impulse of the fired round can be larger than about three times the magnitude of the initial maximum forward momentum.

However, a POSITA would seek to reduce the recoil as much as possible, and thus stay as close to the one-half value as possible, thus disclosing a ratio within the recited range of one-third to one-half. EX1003, ¶84.

Further, with regard to the lower one-third limit, a POSITA would prevent the barrel assembly from moving too far rearwardly. EX1003, ¶85. As such, the rearward momentum cannot be meaningfully larger in magnitude than the forward momentum. A POSITA would therefore understand to implement a forward momentum in the range of one-third to one-half of the impulse of the fired round since, if only a smaller portion of the impulse (e.g. one-third to one-half) is used to cancel forward momentum, more recoil impulse is available for rearward movement. *Id.* If the forward momentum would be too small relative to the full impulse of the round, the barrel assembly would move too far rearwardly. Hence, there is an incentive for the skilled person to stay close to the one-half value. Thus, a POSITA would understand Holek to disclose a ratio of forward momentum of the bolt assembly and the op-rod assembly in the range of one-third to one-half. *Id.*

Furthermore, choosing the right value is a routine design choice for the skilled person designing a machine gun and aiming to minimize the recoil forces

felt by the operator. EX1003, ¶86. This is achieved by limiting the force on the buffer, and hence by staying close to the one-half value. *Id.*

**B. GROUND 2: CLAIMS 1-7, 11, AND 13-16 OF THE '238
PATENT ARE RENDERED OBVIOUS IN VIEW OF ROSSIER**

For at least the reasons below, claims 1-7, 11, and 13-16 of the '238 patent are invalid as anticipated by Rossier.

1. Claim 1

**a) [1.P]: “A weapon system for firing a round,
comprising:”**

To the extent the preamble is limiting, Rossier discloses this limitation. Rossier discloses that it relates to “[a]n automatic projectile firing weapon and a related method for absorbing the recoil force of an automatic projectile firing weapon.” EX1006, abstract; EX1003, ¶88.

b) [1.1]: “a receiver;”

Rossier discloses this limitation. EX1003, ¶89. Rossier describes the invention as including “a receiver that has a main sear and a trackway.” EX1006 at 2:21-22. Rossier further depicts a “receiver 22.” *Id.* at Fig. 1; *see also, e.g., id.* at 4:6.

**c) [1.2]: “an operating group configured to operate the
weapon system through a charged condition, a firing**

condition, and a recoil condition, the operating group comprising”

Rossier discloses this limitation. EX1003, ¶90. Rossier discloses a weapon system for firing ammunition which includes a housing and an operating group that operates the weapon system in a charged, a firing, and a recoil state. EX1006 at 2:18-44. In particular, Rossier discusses in this passage the “firing position,” “when a round is fired,” and that “[t]he recoil energy from the fired round is absorbed in part by the forward motion of the barrel assembly and in part by the operating spring.” *Id.*

(1) [1.2a]: “a barrel extension at least partially housed within the receiver and arranged to axially translate relative to the receiver;”

Rossier discloses this limitation. Rossier describes a barrel assembly consisting of a barrel, barrel extension and bolt assembly. More particularly, Rossier states, “barrel assembly 34 includes a barrel 52, a barrel extension 60 and a bolt assembly 42.” EX1003, ¶91; EX1006 at 5:11-12. Rossier also discloses that the “barrel assembly,” (and thus also the barrel extension included therein) extends at least partially within the receiver and is arranged in such a way that it can move axially relative to the receiver by being “slidably mounted” in the receiver. EX1003, ¶91; EX1006 at 4:30-32.

(2) [1.2b]: “an operating rod (op-rod) assembly at least partially housed and arranged to axially

translate within the barrel extension in the charge condition, the firing condition, and the recoil condition; and”

Rossier discloses this limitation. Rossier discloses an operating rod assembly which is partially mounted within the barrel extension and which can be moved axially therein in a charged, a firing and a recoil state. In particular, Rossier describes a “bolt carriage 92” which, in addition to reference number 94, corresponds to the claimed operating rod assembly and which is shown schematically in Figure 5 of Rossier (denoted by purple box, below). EX1003, ¶92; EX1006 at Fig. 5.

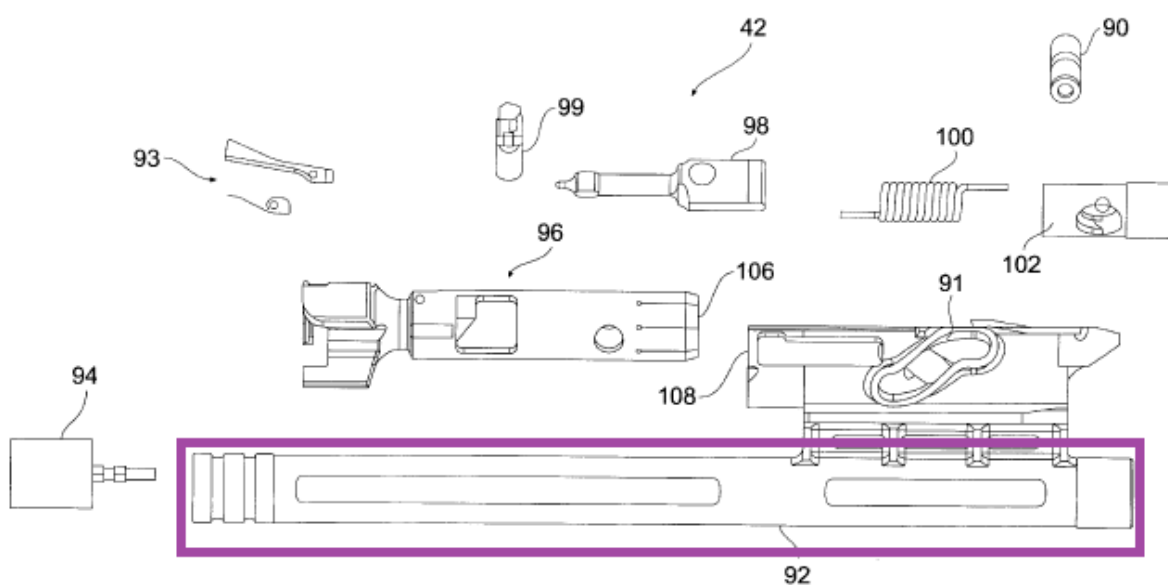


FIG. 5

Rossier, Fig. 5 (annotated)

The bolt carriage is arranged in such a way that it is partially mounted within the barrel extension and can move axially in the barrel extension over the various operating states of the weapon. EX1003, ¶93. In particular, Rossier states, “Barrel extension 60 extends rearward from barrel 52 and defines a track 112. Bolt assembly 42 is slidably positioned in track 112.” EX1006 at 5:14-16. Rossier further states, “bolt carriage 92 is slidably disposed within a gas cylinder 82 of barrel assembly 34. In this embodiment, the gas cylinder 82 is an integral part of barrel extension 60. The bolt spring acts on bolt carriage 92 to move bolt carriage 92 forwardly within track 112 and gas cylinder 82 of barrel extension 60.” *Id.* at 5:22-27.

(3) [1.2c]: “a bolt assembly coupled to the op-rod assembly and at least partially housed and arranged to axially translate within the barrel extension;”

Rossier discloses this limitation. Rossier discloses a bolt assembly (shown below as bolt body 96 of Figure 5), which is connected to the operating rod assembly and, like the operating rod assembly, is arranged at least partially within the barrel extension and is axially movable therein:

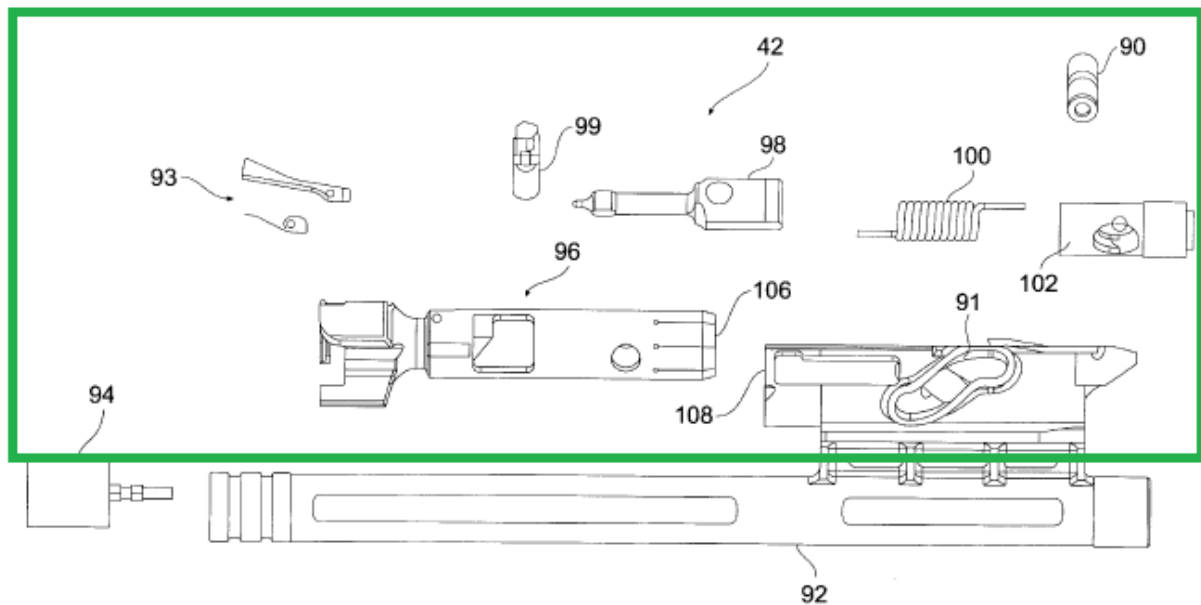


FIG. 5

Rossier, Fig. 5 (annotated)

EX1003, ¶94; EX1006 at Fig. 5. As can be seen in Figure 5, the bolt assembly in Rossier is a rotary assembly, which is rotated by the axial displacement of the bolt carriage in relation to the bolt body, thereby closing the firing chamber before the shot is fired. EX1003, ¶94; EX1006 at 5:39-48.

d) [1.3]: “a barrel coupled to the barrel extension and defining a chamber;”

Rossier discloses this limitation. Rossier depicts and describes a barrel that is coupled to the barrel extension and that defines an ignition chamber. EX1003, ¶95; EX1006 at 5:11-15.

- e) **[1.4]: “a gas accelerator with a first end coupled to the barrel and a second end coupled to the op-rod assembly; and”**

Rossier discloses this limitation. Rossier describes a gas accelerator having a first end connected to the barrel and a second end connected to the op-rod assembly, i.e. the bolt carriage. EX1003, ¶96. More specifically, Rossier states:

Propellant *gas* from the fired round *accelerates* the projectile through *barrel* 52. When the accelerating projectile passes a gas port in barrel 52, bleed gas is directed through gas port 83 into gas chamber 82 to *move bolt assembly 42 rearwardly in barrel extension 60* accomplishing unlock of the bolt and extraction of the spent casing from the chamber.

EX1006 at 9:19-24 (emphases added). The rearward movement described above is based on the backward movement of the bolt carriage, which, as further described in Rossier, is driven backwards by the gas accelerator. EX1003, ¶96; EX1006 at 5:58-62.

- f) **[1.5]: “a buffer assembly comprising a drive spring having a first end coupled to the receiver and a second end coupled to the op-rod assembly,”**

Rossier discloses this limitation. Rossier discloses an “operating spring 44” which is part of the buffer assembly of Rossier, which also comprises, with the “bolt spring 95”, a sophisticated pressure spring which is coupled between the

operating rod assembly and the receiver, and which has a first end coupled to the receiver and a second end coupled to the op-rod assembly. EX1003, ¶97; EX1006 at 6:26-32; Fig. 12. More specifically, Rossier states:

Bolt carriage 92 moves rearwardly, *compressing the bolt spring* until bolt assembly 42 engages bolt bumper 56 and the bolt sear (not shown). The continuing rearward motion of handle 40 and pawl 122 then *causes the entire barrel assembly 34 to move rearwardly within receiver 22*. The rearward motion of *barrel assembly 34 compresses operating spring 44* and continues until barrel assembly 34 engages main sear.

EX1006 at 9:19-24 (emphasis added).

- g) **[1.6]: “wherein, in the charged condition, the op-rod assembly and the bolt assembly are retracted against the drive spring;”**

Rossier discloses this limitation. Rossier discloses a charged condition in which the bolt assembly and the operating rod assembly are retracted against a drive spring. EX1003, ¶98; EX1006 at 8:33-36, 8:63-66.

- h) **[1.7a]: “wherein, in the firing condition, the op-rod assembly and bolt assembly are driven by the drive spring such that the round is guided into the chamber and the op-rod assembly and bolt assembly are locked to the barrel extension and a forward momentum of**

the op-rod assembly is imparted to the operating group and the round is fired,”

Rossier discloses this limitation. Rossier describes that, at the beginning of the firing condition, the bolt carriage is driven by the drive spring such that the bolt assembly picks up a cartridge, inserts it into the firing chamber, and then closes the firing chamber by means of the rotating mechanism of the bolt carriage. EX1003, ¶99; EX1006 at 5:31-46. More specifically, Rossier states that “[t]he bolt spring urges bolt assembly 42 forwardly until the stripped round is rammed and locked into chamber 88.” EX1006 at 5:36-38. Rossier further states:

The bolt 96 is stopped when the round is chambered. The bolt carriage 92, however, will continue forward, ***urged by the bolt spring***. Bolt assembly 42 includes a cam pin 90 that engages bolt body 96 and a cam surface 91 in bolt carriage 92. As bolt carriage 92 moves forward, cam pin 90 rides along cam surface 91 to convert the linear motion of bolt carriage 92 into a ***rotary motion of bolt body*** 96, to engage the bolt body lugs with barrel lugs 89 (referring to FIG. 4).

EX1006 at 5:39-48 (emphasis added); EX1003, ¶99.

- i) **[1.7b]: “wherein a portion of an impulse of the fired round stops the forward momentum of the operating group; and”**

Rossier discloses this limitation. Rossier discloses that the op-rod assembly transmits its propulsion to the operating group and that the latter is still in forward motion at the moment when the cartridge is fired by the impact of the firing pin on the firing plate of the cartridge, which results in the forward motion of the operating group being stopped by the impulse of the discharged shot. EX1003, ¶100; EX1006 at 2:41-44; 9:31-35.

- j) **[1.8]: “wherein, in the recoil condition, the operating group is driven rearward by the remaining portion of the impulse of the fired round, the gas accelerator imparts additional rearward momentum to the op-rod assembly and bolt assembly and stops rearward momentum of the barrel and barrel extension, and the op-rod assembly and the bolt assembly are stopped by the drive spring.”**

Rossier discloses this limitation. Rossier discloses cancellation of forward momentum and then rearward movement of the operating group, consistent with the description of the recoil impulse in Rossier from the fired round. EX1003, ¶101; *see, e.g.*, EX1006 at 9:31-35. For example, Rossier states:

Part of the *recoil impulse* of the fired round *Cancels the forward momentum of the barrel assembly* 34. After this deceleration, the remainder of the recoil impulse *accelerates*

the barrel assembly 34 rearwardly along the recoil stroke
within receiver 22

EX1006 at 9:31-35 (emphasis added). EX1003, ¶101.

Moreover, Rossier discloses that the backward movement of the operating rod and bolt assembly is additionally accelerated by the gas accelerator. EX1003, ¶102; *see, e.g.*, EX1006 at 9:31-35. More specifically, Rossier states:

Propellant gas from the fired round accelerates the projectile through barrel 52. When the accelerating projectile passes a gas port in barrel 52, *bleed gas is directed through gas port 83 into gas chamber 82 to move bolt assembly 42 rearwardly* in barrel extension 60 accomplishing unlock of the bolt and extraction of the spent casing from the chamber.

EX1006 at 9:19-24 (emphasis added). EX1003, ¶102. A POSITA would understand that this description, in conjunction with the description above disclosing that the recoil impulse accelerates the barrel assembly rearwardly, discloses that the gas accelerator is involved in stopping the rearward momentum of the barrel and barrel extension. EX1003, ¶102.

Rossier also discloses the stopping of the op-rod assembly and the bolt assembly by the drive spring. The pressure generated in the gas cylinder drives the bolt carriage backwards on the one hand, and on the other hand creates an

opposing force acting forwards which, due to the fixed connection between the gas cylinder and the barrel, acts in a forward direction on the op-rod assembly and the bolt assembly, thus stopping the backwards movement of the op-rod assembly and the bolt assembly. EX1003, ¶103; EX1006, 9:28-30 (“Bolt assembly 42 moves rearwardly within barrel extension 60 to compress the bolt spring and re-engage the bolt sear.”); 9:40-44 (“The maximum rearward velocity of barrel assembly 34 allowed by buffer 140 is chosen to accomplish the feed index function, recompress the main spring, and to prevent the barrel assembly from moving too far rearwardly within receiver 22.”).

2. Claim 2: The weapon system of claim 1, wherein the buffer further includes a hydraulic piston configured to resist forward and rearward movement of the barrel extension.

Rossier discloses a buffer with a hydraulic piston which is coupled to the barrel extension and has a spring. This inhibits the forward and backward movement of the barrel extension. EX1003, ¶104; EX1006, 9:39-52.

3. Claim 3: The weapon system of claim 2, wherein the buffer further includes a buffer spring configured to resist forward and rearward movement of the barrel extension.

Rossier discloses a buffer with a hydraulic piston which is coupled to the barrel extension and has a spring. This inhibits the forward and backward movement of the barrel extension. EX1003, ¶105; EX1006, 9:39-52.

- 4. Claim 4: The weapon system of claim 3, wherein the hydraulic piston and the buffer spring are configured such that any force transfer between the barrel extension and the receiver occurs through the hydraulic piston and the buffer spring.**

Rossier discloses a buffer with a hydraulic piston which is coupled to the barrel extension and has a spring. This inhibits the forward and backward movement of the barrel extension. EX1003, ¶106; EX1006, 9:39-52.

- 5. Claim 5: The weapon system of claim 1, further comprising a lock assembly configured to secure the bolt assembly to the op-rod assembly in the charged condition through chambering the round.**

Rossier discloses that the bolt assembly is locked in the charged and firing state with the op-rod assembly, and that both move together until the cartridge has been inserted into the firing chamber. Further, the bolt assembly is secured to the op-rod assembly until the bolt hits the barrel extension, with relative movement between the bolt assembly and the op-rod assembly then taking place.

Consequently, Rossier discloses a locking assembly in which the bolt assembly is secured, or locked, to the barrel extension. EX1003, ¶107; EX1006, 8:23-24.

Rossier further discloses that, in the charged condition, the bolt assembly and the operating rod assembly are retracted against a drive spring and relative movement between the bolt assembly and the operating rod assembly is prevented by this locking assembly. EX1003, ¶107; EX1006, 8:33-36, 8:63-66.

6. Claim 13:

a) [13.P]: “A method for firing a weapon, comprising:”

To the extent the preamble is limiting, Rossier discloses this limitation.

EX1003, ¶108. As discussed above, Rossier discloses that it relates to “[a]n automatic projectile firing weapon and a related method for absorbing the recoil force of an automatic projectile firing weapon.” EX1006, abstract; *supra* at VIII.B.1.a. Rossier discloses this limitation for the same reasons.

b) [13.1]: “retracting a bolt assembly and an operating rod (op-rod) assembly relative to a barrel extension against a drive spring;”

Rossier discloses this limitation. EX1003, ¶109. As discussed above, Rossier discloses “an operating rod (op-rod) assembly.” *Supra* at VIII.B.1.c.2. As discussed above, Rossier discloses “a bolt assembly.” *Supra* at VIII.B.1.c.3. As discussed above, Rossier discloses that, in the charged condition, “the op-rod assembly and the bolt assembly are retracted against the drive spring.” *Supra* at VIII.B.1.g. Rossier discloses this limitation for the same reasons.

c) [13.2]: “driving the bolt assembly and the op-rod assembly with a forward momentum within the barrel extension such that the bolt assembly chambers a round and contacts the barrel extension, imparting forward momentum to the op-rod assembly, the bolt assembly and the barrel extension such that the round is fired, whereby the firing of the round stops the forward momentum and imparts an impulse of

rearward momentum on the op-rod assembly, the bolt assembly, and the barrel extension,”

Rossier discloses this limitation. EX1003, ¶110. As discussed above, Rossier discloses that, in the firing condition, “the op-rod assembly and bolt assembly are driven by the drive spring such that the round is guided into the chamber and the op-rod assembly and bolt assembly are locked to the barrel extension and a forward momentum of the op-rod assembly is imparted to the operating group and the round is fired, wherein a portion of an impulse of the fired round stops the forward momentum of the operating group.” *Supra.* at VIII.B.1.h. As also discussed above, the operating group comprises a barrel extension, an op-rod assembly, and a bolt assembly. *Supra.* at VIII.B.1.c. Rossier discloses this limitation for the same reasons.

- d) **[13.3]: “wherein the driving step includes securing the bolt assembly to the op-rod assembly in the charged condition until the bolt assembly engages the barrel extension, wherein the driving step includes releasing the bolt assembly from the op-rod assembly when the bolt assembly engages the barrel extension, wherein the driving step includes securing the bolt assembly to the barrel extension during the contact with the barrel extension;”**

Rossier discloses this limitation. EX1003, ¶111. Rossier describes that, at the beginning of the firing condition, the bolt carriage is driven by the drive spring such that the bolt assembly picks up a cartridge, inserts it into the firing chamber,

and then closes the firing chamber by means of the rotating mechanism of the bolt carriage of the bolt assembly. EX1003, ¶111; EX1006 at 5:31-46. More specifically, Rossier states that “[t]he bolt spring urges bolt assembly 42 forwardly until the stripped round is rammed and locked into chamber 88.” EX1006 at 5:36-38. Rossier further states:

The bolt 96 is stopped when the round is chambered. The bolt carriage 92, however, will continue forward, *urged by the bolt spring*. Bolt assembly 42 includes a cam pin 90 that engages bolt body 96 and a cam surface 91 in bolt carriage 92. As bolt carriage 92 moves forward, cam pin 90 rides along cam surface 91 to convert the linear motion of bolt carriage 92 into a *rotary motion of bolt body 96*, to engage the bolt body lugs with barrel lugs 89 (referring to FIG. 4).

EX1006 at 5:39-48 (emphasis added). EX1003, ¶111.

Rossier discloses that the op-rod assembly transmits its propulsion to the operating group and that the latter is still in forward motion at the moment when the cartridge is fired by the impact of the firing pin on the firing plate of the cartridge, which results in the forward motion of the operating group being stopped by the impulse of the discharged shot. EX1003, ¶112; EX1006 at 2:41-44; 9:31-35.

In the firing condition, Rossier describes a rotating bolt (*see, e.g.*, EX1006 at 5:31-46) which releases (i.e., “accomplishing unlock of the bolt”) after the shot has been fired. The bolt assembly is then moved axially to the rear in the barrel extension. EX1003, ¶113; EX1006 at 9:19-30.

Rossier was cited by the examiner during prosecution of the '238 patent. The Board should nevertheless consider Rossier in the present proceeding for this limitation. During prosecution, the applicant argued that Rossier did not disclose “the op-rod assembly and the bolt assembly [being] locked to the barrel extension during the firing condition.” EX1002 at 171. However, as shown above, Rossier describes a rotating bolt assembly, which is rotated by the axial displacement, and thus *closes* the firing chamber *before the shot is fired*, thereby locking the op-rod assembly and the bolt assembly to the barrel extension *during the firing condition*. EX1006 at 5:31-46. More specifically, “securing” does not require a fixed connection, but only the absence of relative movement between the bolt assembly and the op-rod assembly. EX1003, ¶114; EX1006, 8:23-24. By not considering this teaching in Rossier, the examiner “erred in a manner material to the patentability of the challenged claims.” *Medacta USA, Inc. v. RSB Spine, LLC*, IPR2020-00264, Paper 24 at 16 (PTAB May 22, 2020). Importantly, the examiner erred by not considering this disclosure of Rossier in connection with the locking limitations of claims 1 and 13.

- a) **[13.4]: “guiding gases from the round with a gas accelerator to drive the op-rod assembly rearward and to stop the rearward momentum of the barrel extension; and”**

Rossier discloses this limitation. EX1003, ¶115. As discussed above, Rossier discloses that, in the recoil condition, “the gas accelerator imparts additional rearward momentum to the op-rod assembly and bolt assembly and stops rearward momentum of the barrel and barrel extension, and the op-rod assembly and the bolt assembly are stopped by the drive spring.” *Supra.* at VIII.B.1.i. The pressure generated in the gas cylinder drives the bolt carriage backwards on the one hand, and on the other hand creates an opposing force acting forwards which, due to the fixed connection between the gas cylinder and the barrel, acts forwards on the barrel and the barrel extension connected to the barrel, thus stopping the backwards movement of the barrel and barrel extension. EX1003, ¶115; EX1006 at 9:19-24. Rossier therefore discloses this limitation for the same reasons.

- b) **[13.5]: “absorbing the rearward momentum of the op-rod assembly with the drive spring.”**

Rossier discloses this limitation. EX1003, ¶116. As discussed above, Rossier also discloses the stopping the rearward momentum of the op-rod assembly and the bolt assembly by the “bolt spring.” *Supra.* at VIII.B.1.i (citing EX1003,

¶103; EX1006 at 9:28-30). Rossier therefore discloses this limitation for the same reasons.

7. **Claim 14: The method of claim 13, wherein the driving step includes driving the bolt assembly and the op-rod assembly with the forward momentum that is approximately one-third to one-half of the impulse of the round.**

The limitation added in dependent claim 14 recites an arbitrary design decision regarding the portion of forward momentum transferred to the op-rod assembly and the bolt assembly with respect to the total impulse of the round. Further, the '238 patent does not disclose any benefit or advantage realized from the transfer of forward momentum compared to the impulse of the round of this range compared to ratios outside this range. As such, this limitation is disclosed or is rendered obvious by Rossier or by Rossier in view of the knowledge of a POSITA. EX1003, ¶117; EX1001, 11:9-13.

8. **Claim 15: The method of claim 13, further comprising the step of restraining movement of the op-rod assembly in forward and aft directions with a buffer assembly.**

Rossier discloses a buffer with a hydraulic piston which is coupled to the barrel extension and has a spring. This inhibits the forward and backward movement of the barrel extension. EX1003, ¶118; EX1006, 9:39-52.

- 9. Claim 16: The method of claim 15, wherein the restraining step includes restraining movement of the barrel extension assembly in forward and aft directions with a soft spring and a hydraulic piston valve of the buffer assembly.**

Rossier discloses a buffer with a hydraulic piston which is coupled to the barrel extension and has a spring. This inhibits the forward and backward movement of the barrel extension. EX1003, ¶119; EX1006, 9:39-52.

C. GROUND 3: CLAIMS 1-4 AND 13-16 OF THE '238 PATENT ARE RENDERED OBVIOUS BY HOLEK IN VIEW OF ROSSIER

For at least the reasons below, claims 1-4, and 13-16 of the '238 patent are invalid as obvious over Holek in view of Rossier.

1. Motivation to Combine

A POSITA would have been motivated to combine Holek with Rossier, and would have had a reasonable expectation of success. Both references are from the same field of endeavor: automatic firearms with recoiling barrels, and are directed towards controlling the amount of recoil load in the automatic firearms. EX1003 at ¶121; EX1005, p.1, col.1, ll.1-3; EX1006, abstract. In order to control the amount of recoil, a POSITA would have been aware of the capability and design reasons for using a movable barrel which is driven back by the recoil of the shot during operation as disclosed in Holek. EX1003 at ¶121; EX1005, p.1, col.1, ll.35-40. A POSITA would also have been aware of the capability and design reasons

for using the locking assembly of Rossier in order to further control the transfer of recoil of the shot in operation. EX1003, ¶121; EX1006, 8:23-24.

Furthermore, Holek explicitly teaches that the forward movement of the “breechblock carrier” (i.e., the op-rod assembly) during recoil is “known.”

EX1003, ¶122; EX1005 at p.1, col.2, ll.51 - p.2, col.1, ll.1; p.2, col.2, ll.58-65.

That the breechblock carrier took the form of a rod having a piston was also known. EX1005 at p.1, col.2, ll.32-36. A POSITA would also recognize that the rod-and-piston design of Holek would benefit from the hydraulic piston design disclosed in Rossier, with hydraulic pistons being well-known generally before both Rossier and the critical date of the ’238 patent. EX1003, ¶122.

A POSITA would have reasonably expected the proposed combination of Holek and Rossier to succeed. EX1003, ¶123. Holek provides implementation details for its movable barrel. EX1005, p.2, col.2, ll.31-65. Rossier also provides implementation details for its locking assembly. EX1006, 8:33-36, 8:63-66.

Incorporating Rossier’s teachings into Holek would be a straightforward change and well within the capabilities of a POSITA. EX1003, ¶123.

Holek, Rossier, and the ’238 patent are analogous art, as they are all directed to automatic firearms. *See* EX1001, Abstract; EX1005, p.1, col.1, ll.1-3; EX1006, Abstract; EX1003, ¶124.

2. Claim 1

Holek discloses the limitations of independent claim 1. *Supra* at VIII.A.1.

3. Claim 2: The weapon system of claim 1, wherein the buffer further includes a hydraulic piston configured to resist forward and rearward movement of the barrel extension.

Rossier discloses the limitations added in dependent claim 2. *Supra* at VIII.B.2.

4. Claim 3: The weapon system of claim 2, wherein the buffer further includes a buffer spring configured to resist forward and rearward movement of the barrel extension.

Rossier discloses the limitations added in dependent claim 3. *Supra* at VIII.B.3.

5. Claim 4: The weapon system of claim 3, wherein the hydraulic piston and the buffer spring are configured such that any force transfer between the barrel extension and the receiver occurs through the hydraulic piston and the buffer spring.

Rossier discloses the limitations added in dependent claim 4. *Supra* at VIII.B.4.

6. Claim 13

Holek discloses the limitations of independent claim 13. *Supra* at VIII.A.2.

7. **Claim 14: The method of claim 13, wherein the driving step includes driving the bolt assembly and the op-rod assembly with the forward momentum that is approximately one-third to one-half of the impulse of the round.**

Rossier discloses the limitations added in dependent claim 14. *Supra* at VIII.B.7.

8. **Claim 15: The method of claim 13, further comprising the step of restraining movement of the op-rod assembly in forward and aft directions with a buffer assembly.**

Rossier discloses the limitations added in dependent claim 15. *Supra* at VIII.B.8.

9. **Claim 16: The method of claim 15, wherein the restraining step includes restraining movement of the barrel extension assembly in forward and aft directions with a soft spring and a hydraulic piston valve of the buffer assembly.**

Rossier discloses the limitations added in dependent claim 16. *Supra* at VIII.B.9.

D. GROUND 4: CLAIMS 1, 5-13, AND 17 OF THE '238 PATENT ARE RENDERED OBVIOUS BY HOLEK IN VIEW OF CHINN

For at least the reasons below, claims 1, 5-13, and 17 of the '238 patent are invalid as obvious over Holek in view of Chinn.

1. Motivation to Combine

A POSITA would have been motivated to combine Holek with Chinn, and would have had a reasonable expectation of success. Both references are from the same field of endeavor: automatic firearms with recoiling barrels, and are directed

towards controlling the amount of recoil load in the automatic firearms. EX1003 at ¶134; EX1005, p.1, col.1, ll.1-3; EX1007, 271. In order to control the amount of recoil, a POSITA would have been aware of the capability and design reasons for using a movable barrel which is driven back by the recoil of the shot during operation as disclosed in Holek. EX1003 at ¶134; EX1005, p.1, col.1, ll.35-40. A POSITA would also have been aware of the capability and design reasons for using the rotatable locking bolt assembly of Chinn in order to further control the transfer of recoil of the shot in operation. EX1003, ¶134; EX1007, p.273, col.2.

Furthermore, Holek explicitly teaches that that the forward movement of the “breechblock carrier” (i.e., the op-rod assembly) during recoil is “known.” EX1003, ¶135; EX1005 at p.1, col.2, ll.51 - p.2, col.1, ll.1; p.2, col.2, ll.58-65. That the breechblock carrier took the form of a rod having a piston was also known. EX1005 at p.1, col.2, ll.32-36. A POSITA would also recognize that the rod-and-piston design of Holek would benefit from the rotatable locking bolt design disclosed in Chinn, with rotatable locking bolts being well-known generally before Chinn and the critical date of the '238 patent. EX1003, ¶135.

A POSITA would have reasonably expected the proposed combination of Holek and Chinn to succeed. EX1003, ¶136. Holek provides implementation details for its movable barrel. EX1005, p.2, col.2, ll.31-65. Chinn also provides implementation details for its rotatable locking bolt assembly. EX1007, p.273,

col.2. Incorporating Chinn's teachings into Holek would be a straightforward change and well within the capabilities of a POSITA. EX1003, ¶136.

Holek, Chinn, and the '238 patent are analogous art, as they are all directed to automatic firearms. *See* EX1001, Abstract; EX1005, p.1, col.1, ll.1-3; EX1007, 271; EX1003, ¶137.

2. Claim 1

Holek discloses the limitations of independent claim 1. *Supra* at VIII.A.1.

3. Claim 5: The weapon system of claim 1, further comprising a lock assembly configured to secure the bolt assembly to the op-rod assembly in the charged condition through chambering the round.

Chinn discloses the limitations added in dependent claim 5. Chinn discloses that in the M60 machine gun, "As the bolt enters the barrel socket, the round has been deflected downward and into the chamber by the front cartridge guide, the receiver feed ramps, and the barrel socket feed ramp." EX1007 at 273, col.2. This disclosure teaches that the lock assembly secures the bolt assembly to the operating rod assembly in the charged condition during the chambering of the round. EX1003, ¶139.

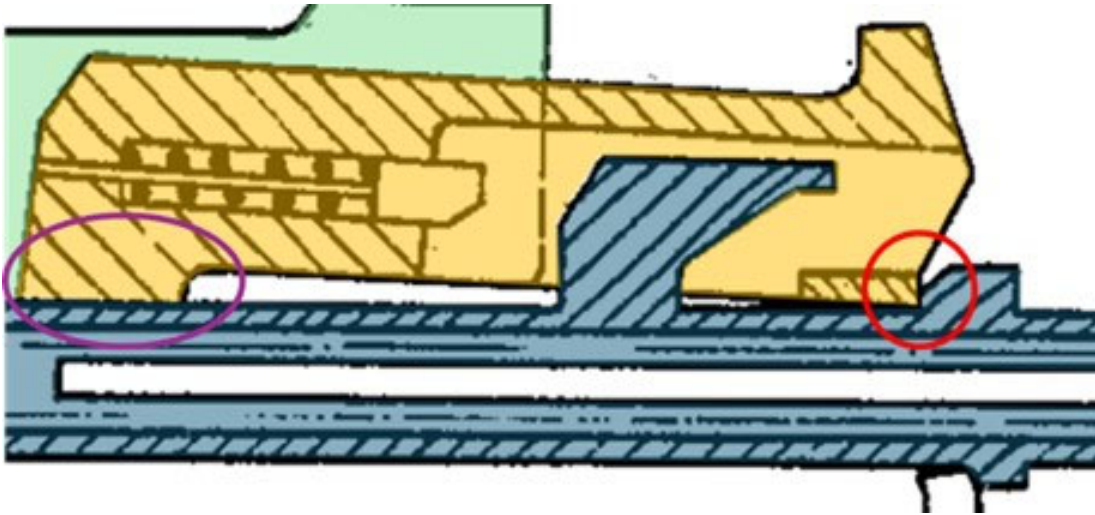
4. Claim 6: The weapon system of claim 5, wherein the lock assembly is configured to release the bolt assembly from the op-rod assembly in the firing condition.

Chinn discloses the limitations added in dependent claim 6. Chinn discloses that the M60 machine gun provides "barrel socket lead cams [that] impart

clockwise rotation to the bolt sufficient to enter the locking lugs into the socket locking cam.” EX1007 at 273, col.2. Chinn further explains that “[a]s the bolt rotates, its rotating cam releases the firing pin. The firing pin spring now contributes its energy to the operating rod through the bolt rotating cam and aids the drive spring to complete the bolt locking rotation.” *Id.* This disclosure teaches that the lock assembly releases the bolt assembly from the operating rod assembly in the firing condition. EX1003, ¶140.

5. Claim 7: The weapon system of claim 6, wherein the lock assembly is further configured to secure the bolt assembly to the barrel extension in the firing condition.

Holek discloses the limitations added in dependent claim 7. Holek discloses in Figure 3 that the bolt arrangement is secured (red circle) by the backward tilted position of the bolt on a projection of the operating rod assembly. EX1003, ¶141; EX1005 at Fig. 3.



Holek, Fig. 3 (excerpt, annotated)

6. **Claim 8: The weapon system of claim 7, wherein the lock assembly includes a lock pin, a first cam defined in the op-rod assembly, and a second cam in the barrel extension, wherein the lock pin engages the first cam and the second cam to secure and release the bolt assembly relative to the barrel extension and the op-rod group.**

Chinn discloses the limitations added in dependent claim 8. Chinn discloses that in the M60 machine gun, “As the bolt enters the barrel socket, the round has been deflected downward and into the chamber by the front cartridge guide, the receiver feed ramps, and the barrel socket feed ramp. The barrel socket lead cams impart clockwise rotation to the bolt sufficient to enter the locking lugs into the socket locking cam.” EX1007 at 273, col.2. Chinn further explains that “[a]s the bolt rotates, its rotating cam releases the firing pin. The firing pin spring now contributes its energy to the operating rod through the bolt rotating cam and aids the drive spring to complete the bolt locking rotation.” *Id.* This disclosure teaches

the lock pin, a cam in the op-rod assembly, a cam in the barrel extension, with the lock pins engaging the cams in order to secure and release the bolt assembly relative to the barrel extension and the operating rod. EX1003, ¶142.

7. **Claim 9: The weapon system of claim 8, wherein in a first portion of the firing condition, the lock pin is engaged by the first cam and the second cam to secure the bolt assembly to the op-rod assembly such that the op-rod assembly forces the bolt assembly forward, and wherein, in a second portion of the firing condition upon contact of the bolt assembly and the barrel extension, the lock pin disengages from the second cam and the first cam guides the lock pin such that the bolt assembly forms a locking engagement with the barrel extension.**

Chinn discloses the limitations added in dependent claim 9. Chinn discloses that the M60 machine gun provides “barrel socket lead cams [that] impart clockwise rotation to the bolt sufficient to enter the locking lugs into the socket locking cam.” EX1007 at 273, col.2. Chinn further explains that “[a]s the bolt rotates, its rotating cam releases the firing pin. The firing pin spring now contributes its energy to the operating rod through the bolt rotating cam and aids the drive spring to complete the bolt locking rotation.” *Id.* This disclosure teaches engagement of and disengagement of the lock pin and cams prior to and subsequent to, respectively, firing. EX1003, ¶143.

- 8. Claim 10: The weapon system of claim 9, wherein, in the recoil condition, the rearward movement of the op-rod assembly guides the lock pin within the second cam such that the bolt assembly is released relative to the barrel extension.**

Chinn discloses the limitations added in dependent claim 10. Chinn discloses that the M60 machine gun provides “barrel socket lead cams [that] impart clockwise rotation to the bolt sufficient to enter the locking lugs into the socket locking cam.” EX1007 at 273, col.2. Chinn further explains:

The piston, propelled rearward by the trapped expanding hot gases, forces the operating rod rearward to contact the firing pin rear spool. This compresses the firing pin spring withdrawing the firing pin from the cartridge primer as well as compressing the operating rod spring. Rearward motion of the operating rod continues in the ‘dwell’ slot of the bolt rotating cam, until the rod yoke rollers contact the spiral, or counterrotating part of the bolt cam. The bolt now begins its counterclockwise rotation and unlocking, urged by the energy of the operating rod. At full unlock, the firing pin is fully cocked, the roller of the rod cam yoke contacting the rear of the bolt rotating cam.

Id. at 273, col.2 - 275, col.1. This disclosure teaches that the rearward movement of the op-rod guides the lock pin within the cam, and further that it releases the firing pin, which releases the bolt assembly. EX1003, ¶144.

9. Claim 11: The weapon system of claim 1, wherein in an ejection condition, a case of the round is coupled to the bolt assembly.

Chinn discloses the limitations added in dependent claim 11. Chinn discloses that the cartridge case is removed from the firing chamber by an ejector device after being movably coupled together by propulsion from the expanding gas from firing. EX1003 at ¶145; EX1007 at 275.

10. Claim 12: The weapon system of claim 11, wherein the barrel extension includes an extractor such that, in the ejection condition, the extractor engages the case during the rearward movement of the bolt assembly to remove round from chamber and eject the case from the weapon system.

Chinn discloses the limitations added in dependent claim 11. Chinn discloses that the cartridge case is removed from the firing chamber by an ejector device after being movably coupled together by propulsion from the expanding gas from firing. EX1003 at ¶146; EX1007 at 275.

11. Claim 13

Holek discloses the limitations of independent claim 13. *Supra* at VIII.A.2.

- 12. Claim 17: The method of claim 13, wherein the step of securing the bolt assembly to the barrel extension includes guiding a cam on the bolt assembly into a cam relief of a hold-up cam on the barrel extension and down an op-rod cam on the op-rod assembly such that a first lock surface of bolt assembly pivots to engage a second lock surface of the bolt assembly.**

Chinn discloses the limitations added in dependent claim 17. Chinn discloses that in the M60 machine gun, “As the bolt enters the barrel socket, the round has been deflected downward and into the chamber by the front cartridge guide, the receiver feed ramps, and the barrel socket feed ramp. The barrel socket lead cams impart clockwise rotation to the bolt sufficient to enter the locking lugs into the socket locking cam.” EX1007 at 273, col.2. Chinn further explains that “[a]s the bolt rotates, its rotating cam releases the firing pin. The firing pin spring now contributes its energy to the operating rod through the bolt rotating cam and aids the drive spring to complete the bolt locking rotation.” *Id.* This disclosure teaches guiding a cam on the bolt assembly into a cam relief on the barrel extension. Chinn further teaches rotational pivots being used to engage the locks. EX1003, ¶148.

E. GROUND 5: CLAIMS 1, 5-13, AND 17 OF THE '238 PATENT ARE RENDERED OBVIOUS BY ROSSIER IN VIEW OF CHINN

For at least the reasons below, claims 1, 5-13, and 17 of the '238 patent are invalid as obvious over Rossier in view of Chinn.

1. Motivation to Combine

A POSITA would have been motivated to combine Rossier with Chinn, and would have had a reasonable expectation of success. Both references are from the same field of endeavor: automatic firearms with recoiling barrels, and are directed towards controlling the amount of recoil load in the automatic firearms. EX1003 at ¶150; EX1006, abstract; EX1007, 271. In order to control the amount of recoil, a POSITA would have been aware of the suitability of using the locking assembly of Rossier in order to further control the transfer of recoil of the shot in operation. EX1003, ¶150; EX1006, 8:23-24. A POSITA would also have been aware of the suitability of using the rotatable locking bolt assembly of Chinn in order to further control the transfer of recoil of the shot in operation. EX1003, ¶150; EX1007, p.273, col.2.

Furthermore, Rossier and Chinn are both directed to locking mechanism. A POSITA would also recognize that the locking assembly of Rossier could alternatively be replaced the rotatable locking bolt design disclosed in Chinn, with rotatable locking bolts being well-known generally before Rossier and the critical date of the '238 patent. EX1003, ¶151.

A POSITA would have reasonably expected the proposed combination of Rossier and Chinn to succeed. EX1003, ¶152. Rossier provides implementation details for its locking assembly. EX1006, 8:33-36, 8:63-66. Chinn also provides

implementation details for its rotatable locking bolt assembly. EX1007, p.273, col.2. Incorporating Chinn's teachings into Rossier would be a straightforward change and well within the capabilities of a POSITA. EX1003, ¶152.

Rossier, Chinn, and the '238 patent are analogous art, as they are all directed to automatic firearms. *See* EX1001, Abstract; EX1006, Abstract; EX1007, 271; EX1003, ¶153.

2. Claim 1

Rossier discloses the limitations of independent claim 1. *Supra* at VIII.B.1.

3. Claim 5: The weapon system of claim 1, further comprising a lock assembly configured to secure the bolt assembly to the op-rod assembly in the charged condition through chambering the round.

Chinn discloses the limitations added in dependent claim 5. *Supra* at VIII.D.3.

4. Claim 6: The weapon system of claim 5, wherein the lock assembly is configured to release the bolt assembly from the op-rod assembly in the firing condition.

Chinn discloses the limitations added in dependent claim 6. *Supra* at VIII.D.4.

5. Claim 7: The weapon system of claim 6, wherein the lock assembly is further configured to secure the bolt assembly to the barrel extension in the firing condition.

Rossier discloses the limitations added in dependent claim 7. Rossier discloses a charged condition in which the bolt assembly and the operating rod

assembly are retracted against a drive spring and relative movement between the bolt assembly and the operating rod assembly is prevented by a locking assembly. Rossier discloses a charged condition in which the bolt assembly and the operating rod assembly are retracted against a drive spring. EX1003, ¶157; EX1006 at 8:33-36, 8:63-66. *Supra* at VIII.D.5.

6. **Claim 8: The weapon system of claim 7, wherein the lock assembly includes a lock pin, a first cam defined in the op-rod assembly, and a second cam in the barrel extension, wherein the lock pin engages the first cam and the second cam to secure and release the bolt assembly relative to the barrel extension and the op-rod group.**

Chinn discloses the limitations added in dependent claim 8. *Supra* at VIII.D.6.

7. **Claim 9: The weapon system of claim 8, wherein in a first portion of the firing condition, the lock pin is engaged by the first cam and the second cam to secure the bolt assembly to the op-rod assembly such that the op-rod assembly forces the bolt assembly forward, and wherein, in a second portion of the firing condition upon contact of the bolt assembly and the barrel extension, the lock pin disengages from the second cam and the first cam guides the lock pin such that the bolt assembly forms a locking engagement with the barrel extension.**

Chinn discloses the limitations added in dependent claim 9. *Supra* at VIII.D.7.

- 8. Claim 10: The weapon system of claim 9, wherein, in the recoil condition, the rearward movement of the op-rod assembly guides the lock pin within the second cam such that the bolt assembly is released relative to the barrel extension.**

Chinn discloses the limitations added in dependent claim 10. *Supra* at

VIII.D.8.

- 9. Claim 11: The weapon system of claim 1, wherein in an ejection condition, a case of the round is coupled to the bolt assembly.**

Chinn discloses the limitations added in dependent claim 11. *Supra* at

VIII.D.9.

- 10. Claim 12: The weapon system of claim 11, wherein the barrel extension includes an extractor such that, in the ejection condition, the extractor engages the case during the rearward movement of the bolt assembly to remove round from chamber and eject the case from the weapon system.**

Chinn discloses the limitations added in dependent claim 12. *Supra* at

VIII.D.10.

11. Claim 13

Rossier discloses the limitations of independent claim 13. *Supra* at VIII.B.6.

- 12. Claim 17: The method of claim 13, wherein the step of securing the bolt assembly to the barrel extension includes guiding a cam on the bolt assembly into a cam relief of a hold-up cam on the barrel extension and down an op-rod cam on the op-rod assembly such that a first lock surface of bolt assembly pivots to engage a second lock surface of the bolt assembly.**

Chinn discloses the limitations added in dependent claim 17. *Supra* at VIII.D.12.

IX. SECONDARY CONSIDERATIONS

Petitioner is not presently aware of any secondary considerations of nonobviousness in connection with any of Grounds 3-5. *Supra* at VIII.C - VIII.E. Petitioner believes that each of Grounds 3-5 present such strong cases of obviousness that secondary considerations could not overcome the fact that the claimed invention is a known use of prior art elements. Petitioner reserves the right to address any secondary considerations raised by the Patent Owner or its expert.

X. MANDATORY NOTICES

A. Real Party-In-Interest

The real party-in-interest is SIG Sauer Inc. Additionally, in an abundance of caution, SIG Sauer identifies its parent company, SIG Sauer US Holding LP, and that company's parent companies, L&O Finance GmbH and SIG Sauer Management LLC as additional real parties-in-interest.

B. Related Matters

SIG Sauer identifies as a potentially related matter: *True Velocity Ammunitions, LLC et al. v. SIG Sauer Inc.*, No. 2:24-522 (D. Vt.), removed from state court on May 10, 2024. In this matter, SIG Sauer filed an answer which included a counterclaim seeking a declaratory judgment of non-infringement of the '238 patent on November 8, 2024.

C. Lead Counsel, Backup Counsel and Service Information

Lead Counsel	Backup Counsel
Steven R. Daniels (Reg. No. 45,345) Dickinson Wright PLLC 607 W. 3rd Street, Suite 2500 Austin, Texas 78701 Telephone: (512) 770-4200 Facsimile: (844) 670-6009 Email: sdaniels@dickinsonwright.com	Bryan D. Atkinson (Reg. No. 52,574) Dickinson Wright PLLC 607 W. 3rd Street, Suite 2500 Austin, Texas 78701 Telephone: (512) 770-4208 Facsimile: (844) 670-6009 Email: batkinson@dickinsonwright.com

Petitioner consents to electronic service of documents to the email addresses of the counsel identified above.

D. PAYMENT OF FEES – 37 C.F.R. § 42.103

The required fee is submitted herewith. Petitioner also authorizes the United States Patent and Trademark Office to charge Deposit Account No. 041061 for any underpayment of fees in this proceeding.

XI. CONCLUSION

Based on the foregoing, the challenged claims are unpatentable.

Accordingly, Petitioner requests institution of an *inter partes* review to cancel these claims.

Respectfully submitted,

DICKINSON WRIGHT PLLC

Dated: January 3, 2025

/ Steven R. Daniels /

Steven R. Daniels, Registration No. 45,345

Attorney for Petitioner

SIG Sauer Inc.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on January 3, 2025 true and correct copies of the foregoing PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 8,919,238, Petitioner's Power of Attorney, and all associated exhibits were served in their entireties on the following parties via FedEx Express or Express Mail:

Sean Burdick
300 N. 6th Street
Suite 200
Boise, ID 83702

And served by email to: kris@burdickpatents.com,
docteting@burdickpatents.com

Dated: January 3, 2025

DICKINSON WRIGHT PLLC

/ Steven R. Daniels /

Steven R. Daniels, Registration No. 45,345
*Attorney for Petitioner
SIG Sauer Inc.*

**CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATION,
TYPEFACE REQUIREMENTS, AND TYPE STYLE REQUIREMENTS**

1. This Petition complies with the type-volume limitation in 37 C.F.R. §42.24(d) in that it contains 13,789 words, excluding the parts exempted by 37 C.F.R. §42.24(a), as measured by the word processing software used to prepare the document.

2. This Petition complies with the general format requirements of 37 C.F.R. §42.6(a) and has been prepared using Microsoft Word 2016 in 14 point Times New Roman.

Dated: January 3, 2025

DICKINSON WRIGHT PLLC

/ Steven R. Daniels /

Steven R. Daniels, Registration No. 45,345
*Attorney for Petitioner
SIG Sauer Inc.*