

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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HUNTING TITAN, INC.

*Petitioner*

v.

DYNAENERGETICS GMBH & CO. KG

*Patent Owner.*

Case: PGR 2020-00080

Patent No. 10,472,938

Issue Date: November 12, 2019

Title: Perforating Gun Components and System

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**PETITION FOR POST GRANT REVIEW OF CLAIMS 1-20 OF U.S.  
PATENT NO. 10,472,938 UNDER 35 U.S.C. §§ 321-28 AND 37 C.F.R. §§  
42.200 ET SEQ.**

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**Appendix of Exhibits**

<b>Exhibit No.</b>	<b>Description</b>
1001	U.S. Patent 10,429,938 (“the Patent”)
1002	U.S. Patent Publication No. 2012/024771 (“Black”)
1003	U.S. Patent No. 4,744,424 (“Lendermon”)
1004	U.S. Patent No. 9,689,223 (“Schacherer”)
1005	Schlumberger 2008 Perforating Services Catalog (“SLB Catalog”)
1006	Infringement Contentions
1007	Parrot Declaration (“Parrot”)
1008	USPTO File History of U.S. Patent 10,472,938 (“File History”)
1009	U.S. Patent No. 5,241,891 (“Hayes”)
1010	Final Written Decision on Case IPR2018-00600; Patent No. 9,581,422; Hunting Titan, Inc., Petitioner vs. Dynaenergetics GMBH & Co. KG, Patent Owner. (“Final Written Decision”)
1011	U.S. Patent No. 7,347,278 (“Lerche ‘278”)
1012	U.S. Patent Publication No. 2016/0084048 (“Harrigan”)
1013	EWAPS-2012-Selective-Perforation-a-game-changer-in-perfor... (“EWAPS”)
1014	U.S. Patent Publication No. 2015/0330192 (“Rogman”)
1015	U.S. Patent No. 9,080,433 (“Lanclos”)
1016	U.S. Patent No. 5,347,929 (“Lerche ‘929”)
1017	U.S. Patent No. 8,451,137 (“Bonavides”)
1018	U.S. Patent Publication No. 2008/0149338 (“Goodman”)
1019	U.S. Patent No. 5,159,146 (“Carisella”)
1020	U.S. Provisional Application 61/733,129, filed Dec. 4, 2012 (“Rogman Prov.”)
1021	U.S. Patent No. 8,091,477 (“Brooks”)
1022	U.S. Publication No. 2009/0272529 (“Crawford”)
1023	U.S. Patent 8,689,868 (“Lerche ‘868”)
1024	U.S. Patent 8,576,090 (“Lerche ‘090”)
1025	U.S. Patent 438,305 (“Edison”)
1026	U.S. Patent 4,670,729 (“Oh”)
1027	U.S. Patent 8,165,714 (“Mier”)

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<b>Exhibit No.</b>	<b>Description</b>
1028	U.S. Provisional 61/819196 (“Harrigan Prov.”)



**I. COMPLIANCE WITH REQUIREMENTS FOR A POST GRANT REVIEW**

Hunting Titan, Inc., (hereinafter “Hunting Titan”) petitions for post grant review (“PGR”) under 35 U.S.C. § 321 of claims 1-20 of U.S. Patent No. 10,472,938 (hereinafter referred to as “the Patent,” (Ex. 1001)).

**A. Certification the Patent May be Contested by Petitioner**

Petitioner is not barred or stopped from requesting post grant review of the Patent. The Petitioner is a defendant in a case alleging infringement of the Patent styled *DynaEnergetics Europe GMBH v. Hunting Titan, Inc. et al.*, Civil Action No. 4:20-cv-2123 in the Southern District of Texas. Other than counterclaims in that suit, neither Petitioner, nor any party in privity with Petitioner, has filed a civil action challenging the validity of any claim of the Patent. Petitioner certifies that the Patent is available for PGR. Petitioner is not barred or estopped from requesting this PGR.

Petitioner requests review of twenty (20) claims of the Patent. Payment of the \$16,000 PGR request fee and the PGR institution fee of \$22,000, plus \$4,125 excess claim PGR request fee for 5 claims after 15 claims, as per 37 CFR § 42.15 has been made. The Director is authorized to charge the fee specified by 37 CFR § 42.15 to Deposit Account No. 012511.

**B. Mandatory Notices (37 CFR § 42.8(a)(1))**

All Mandatory Notices required under 37 CFR § 42.8 (a)(1) are provided as follows:

**1. *Real Party in Interest (§ 42.8 (b)(1))***

The real parties in interest of this petition pursuant to § 42.8 (b)(1) are:

- Hunting Titan, Inc.,
- Hunting Energy Services, Inc.,
- Hunting PLC,
- Hunting Energy Corporation,
- Hunting US Holdings Inc., and
- Hunting Energy Holdings Ltd.

Hunting Titan, Inc. is a wholly owned subsidiary of Hunting Energy Services, Inc. and Hunting Energy Services, Inc. is a wholly owned subsidiary of Hunting PLC. Hunting Energy Services, Inc. is owned by Hunting PLC through the following entities: Hunting Energy Corporation, Hunting US Holdings Inc., and Hunting Energy Holdings Ltd.

**2. *Related Matters (§ 42.8(b)(2))***

The Petitioner is a defendant in a case alleging infringement of the Patent styled *DynaEnergetics Europe GMBH v. Hunting Titan, Inc. et al.*, Civil Action No. 4:20-cv-2123 (“the Litigation”) in the Southern District of Texas. To Hunting Titan’s knowledge, no other Patent proceedings are pending.

**3. *Designation of Lead and Backup Counsel (§ 42.8(b)(3))***

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Lead Counsel: Jason A. Saunders, Reg. No. 65,736, jsaunders@arnold-iplaw.com, 713-335-3020. Backup Counsel: Christopher P. McKeon, Reg. No. 63,281, cmckeon@arnold-iplaw.com, 713-972-1947; Gordon Arnold, Reg. No. 32,395, garnold@arnold-iplaw.com, 713-972-1150.

**4. Proof of Service (§§ 42.8(b)(4))**

Petitioner may be served via electronic mail to lead and backup counsel at the e-mail addresses listed above.

**5. Power of Attorney**

Filed herewith in accordance with 37 CFR § 42.10(b.)

**II. IDENTIFICATION OF CLAIMS BEING CHALLENGED (§ 42.204)**

**A. Patent and Petitioner are eligible under 37 CFR § 42.204(a)**

The Patent is eligible for post grant review (PGR.) Petitioner is not barred or otherwise stopped from requesting a PGR of the Patent.

**B. The time for filing under 37 CFR § 42.202 has not expired**

The Patent was granted on November 12, 2019 and this Petition is filed within 9 months.

**C. Identification of challenge under 37 CFR § 42.204(b) and statement of precise relief requested**

Petitioner requests that the Board initiate PGR of Claims 1-20 of the Patent and find them unpatentable in view of the following:

<b>Ground</b>	<b>Claims</b>	<b>Basis</b>
1	1-20	Indefinite – 35 U.S.C. §112
2	1-20	Written Description – 35 U.S.C. §112
3	1-2, 4-5, 7-20	Anticipated by Schacherer – 35 U.S.C. §102
4	3, 6	Obvious by Schacherer with common knowledge, Rogman, Harrigan, EWAPS, Lendermon, and/or Goodman – 35 U.S.C. §103
5	1-20	Obvious by Schacherer with common knowledge, Black, Lanclos, Rogman, Harrigan, EWAPS, Goodman and/or SLB Catalog – 35 U.S.C. §103
6	1-2, 4-5, 7-9, 11-20	Anticipated by Black – 35 U.S.C. §102
7	3, 6, 10	Obvious by Black with common knowledge, Schacherer, Rogman, Harrigan, EWAPS, Lendermon, and/or Goodman– 35 U.S.C. §103

<b>Ground</b>	<b>Claims</b>	<b>Basis</b>
8	1-2, 4-5, 7-20	Anticipated by Lanclos – 35 U.S.C. §102
9	3, 6	Obvious by Lanclos with common knowledge, Rogman, Harrigan, EWAPS, Lendermon, and/or Goodman – 35 U.S.C. §103
10	1-20	Obvious by Lanclos with common knowledge, Schacherer, Black, Rogman, Harrigan, EWAPS, Lendermon, Goodman and/or SLB Catalog – 35 U.S.C. §103
11	1-17, 19-20	Anticipated by Rogman – 35 U.S.C. §102
12	18	Obvious by Rogman with common knowledge, Schacherer, Harrigan, Black, Lanclos, EWAPS, and/or Lendermon – 35 U.S.C. §103
13	1-20	Obvious by Rogman with common knowledge, Schacherer, Black, Lanclos, Harrigan, EWAPS, Goodman, and/or SLB 2008 – 35 U.S.C. §103
14	1-9, 11-20	Anticipated by Harrigan – 35 U.S.C. §102
15	10, 19	Obvious by Harrigan with common knowledge, Schacherer, Black, Lanclos, and/or EWAPS – 35 U.S.C. §103
16	1-6, 8-10, 12	Anticipated by EWAPS – 35 U.S.C. §102
17	7, 11, 13-20	Obvious by EWAPS with common knowledge, Schacherer, Black, Lanclos, Rogman, Harrigan, Goodman, and/or SLB Catalog – 35 U.S.C. §103
18	1-17, 19-20	Anticipated by Goodman – 35 U.S.C. §102
19	1-20	Obvious by Goodman with common knowledge, Schacherer, Black, Lanclos, Rogman, Harrigan, EWAPS, and/or SLB Catalog – 35 U.S.C. §103

**D. Threshold for PGR under 35 U.S.C. § 324**

It is more likely than not that at least one of the claims 1-20 challenged in this Petition is unpatentable as per 35 U.S.C. § 324(a.)

### III. RELEVANT TECHNOLOGY BACKGROUND

All of the cited references are prior art at least due to their filing or publication before the July 18, 2013 priority date claimed in the Patent.

Perforating guns are typically assembled into tool strings of multiple perforating guns and inserted into a wellbore where one or more guns are detonated. A detonator will detonate the perforating gun, usually upon an electrical signal from the surface through the guns.

#### A. The Patent

The Patent claims a “wireless” detonator and perforating guns and methods of assembling perforating guns using such a “wireless” detonator. The PTAB has already found a very similar patent (9,581,422) anticipated by Schacherer in IPR2018-00600.

#### B. Schacherer

U.S. Patent No. 9,689,223 (“Schacherer”, Ex. 1004), was filed April 1, 2011, published October 4, 2012 and incorporates by reference U.S. Patent Application Publication No. 2009/0272529 (“Crawford”, Ex. 1022), filed on April 30, 2008, published on November 5, 2009.

#### C. Black

U.S. Patent Application Publication No. 2012/0247771 (“Black”, Ex. 1002), was filed March 23, 2012, and published October 4, 2012.

**D. Lanclos**

U.S. Patent No. 9,080,433 (“Lanlcos”, Ex. 1015), was filed February 3, 2011, and published August 9, 2012.

**E. Rogman**

U.S. Patent Application Publication No. 2015/0330192 (“Rogman”, Ex. 1014), filed December 4, 2013, claims priority to Provisional Application 61/733,129 (“Rogman Provisional”, Ex. 1020) filed December 4, 2012.

**F. Harrigan**

U.S. Patent Application Publication No. 2016/0084048 (“Harrigan”, Ex. 1012), filed May 2, 2014, claims priority to Provisional Application 61/819,196 (“Harrigan Provisional” Ex. 1028) filed May 3, 2013.

**G. EWAPS**

EWAPS (Ex. 1013) is a presentation from the 2012 European and West African Perforating Symposium in November 2012, and available at <https://perforators.org/ips-presentations/#1477861391902-31d9bfce-75f1>.

**H. Goodman**

U.S. Patent Application Publication No. 2008/0149338 (“Goodman”, Ex. 1018) was filed December 21, 2006 and published June 26, 2008.

**I. Lendermon**

United States Patent 4,744,424 (“Lendermon” Ex. 1003) was filed August 21, 1986, and issued May 17, 1988.

**J. SLB Catalog**

Schlumberger's Perforating Services Catalog 2008 ("SLB Catalog", Ex. 1005) was published and distributed no later than 2008 by Schlumberger and describes Schlumberger's perforating tools and services, including industry standard safety practices.

**K. Motivations to Combine**

All of the cited references are in the field of oilfield perforating and discuss perforating and the electrical, mechanical, and explosive components used therein. The combination of any of these references with each other would be:

- combining known methods to yield predictable results,
- simple substitution of one known element for another to obtain predictable results,
- use of a known technique to improve similar devices (methods, or products) in the same way,
- applying a known technique to a known device (method, or product) ready for improvement to yield predictable results, and
- "obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.



As discussed below, some modifications/substitutions from the prior art are either explicitly suggested in the references themselves, or are inherent in the common knowledge of a POSITA.

#### **IV. INVALIDITY OF CHALLENGED CLAIMS**

##### **A. Person of Ordinary Skill in the Art**

A person of ordinary skill in the art (POSITA) relevant to the Patent would typically have a Bachelor of Science or Master of Science degree in mechanical or electrical engineering and 2-5 years of experience operating and/or designing perforating tools. (Ex. 1007, Parrott, ¶ 29.)

##### **B. Reasons for allowance**

The Examiner's reasons for allowance were that Schacherer did not disclose "the outer housing 26 in electrical contact with the wireless ground portion 46," and that Schacherer "discloses performing the claimed steps (including step (b) [inserting detonator]) prior to transporting to the wellbore site (3:45-58.)" (Ex. 1008, p. 087.)

The teachings of Schacherer overlooked by the Examiner are readily corrected.

##### ***1. Schacherer teaches the outer housing in contact with the wireless ground portion***

Schacherer teaches that "a single set of conductors could be used for transmitting the signal, with the outer housings 26 and connectors 28, 30 being used

for grounding purposes (if they are made of electrically conductive materials, such as steel, etc.).” (Ex. 1004, 6:18-22; Ex. 1007, Parrott, ¶ 289.) To implement that teaching, the ground contact of electrical connection 46 would be electrically connected to the outer housings, 26, 30, 28, and so on to convey the ground path of the communications circuit. (Ex. 1007, Parrott, ¶ 289.)

**2. *Schacherer teaches installing a detonator at a well site***

Schacherer teaches inserting the detonator, at the wellsite: “[g]enerally, perforating guns are not transported to a wellsite with an electrical detonator coupled to a detonating cord.” (Ex. 1004, 1:12-13; Ex. 1007, Parrott, ¶ 558.)

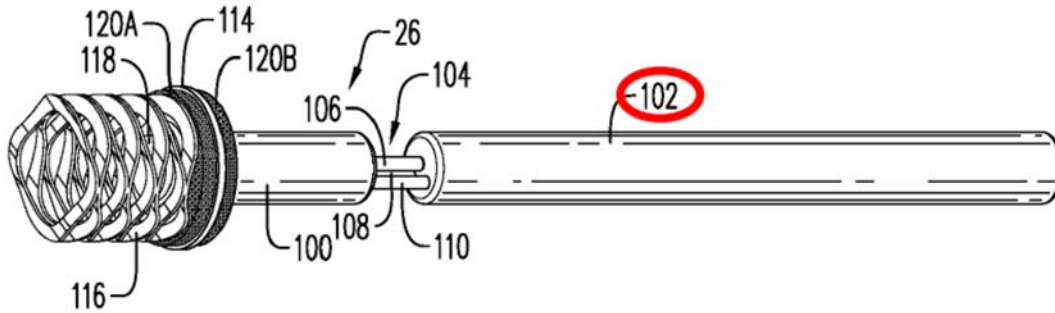
**C. “Wireless” Detonator Elements**

**1. *A Detonator Body***

<b>Claim 1</b>	<b>Claim 9</b>	<b>Claim 13</b>
the detonator including	A modular detonator, comprising:	the detonator including
a detonator body containing detonator components,	a detonator body containing detonator components;	a detonator body containing detonator components,

**a) Indefiniteness, lack of written description, and construction of detonator body**

The Patent never describes the body 102 as containing any “detonator components,” and never discloses what a “detonator component” may be. (Ex. 1001, 8:7-10, FIGS. 27-32; Ex. 1007, Parrott, ¶¶ 215-17.)



**FIG. 27**

Because the Patent never describes any detonator components in a detonator body, or any detonator components at all, it does not provide written description for claims 1, 9, and 13. (Ex. 1007, Parrott, ¶ 217.)

A POSITA's best guess for the meaning of "a detonator body containing detonator components" is a housing, body, or container containing some or all parts of a detonator, or a detonator assembly. (*Id.* at 218.)

There are no references within the specification of the Patent teaching a "modular detonator." (*Id.* at 219.) A POSITA would not have an understanding of what "modular detonator" means and would be unclear about what "modular" adds to the detonator. *Id.* Therefore, claim 9 is indefinite. *Id.*

A POSITA's best guess would be that the modular detonator of claim 9 is any detonator. (*Id.* at 220.)

**b) Common knowledge includes a detonator body**

A POSITA's common knowledge teaches that detonators typically have their parts contained in a housing or body. (*Id.* at ¶ 221.) A POSITA's common

knowledge regarding detonator bodies is shown by the teachings of the prior art generally. (*Id.* at 223-53.)

**c) Schacherer teaches a detonator body**

Schacherer teaches several bodies, including a body around detonator 38, connector 28, connector 30, and connectors 30 and 28 with couplers. (Ex. 1004, 3:33-35, 5:25-31, 6:37-41, 6:57-59, 6:67-7:2, 7:18-20, FIGS. 2, 4-7 & 9; Ex. 1007, Parrott, ¶ 222.)

A POSITA would recognize the highlighted blue regions from Schacherer FIG.'s 4, 5, and 7 as teaching a detonator body.

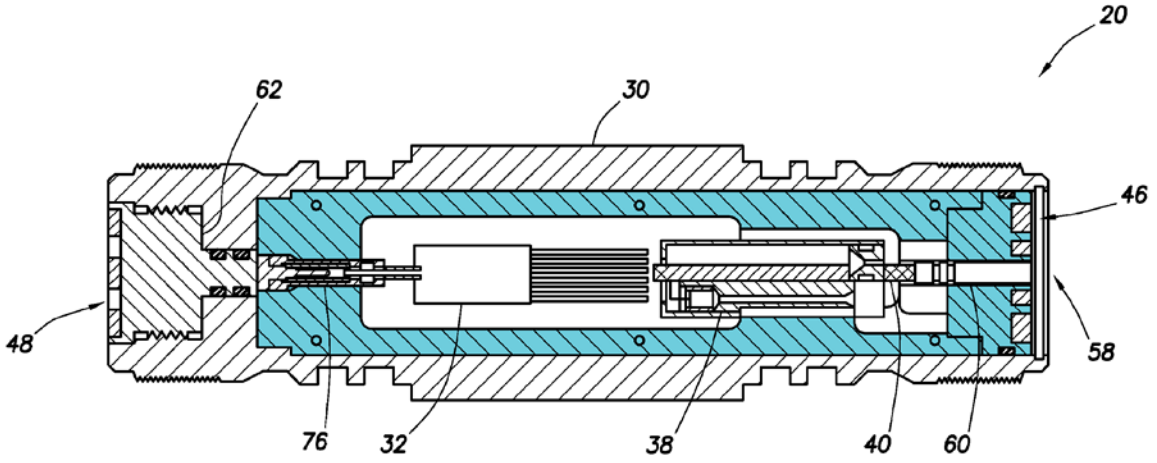


FIG. 4

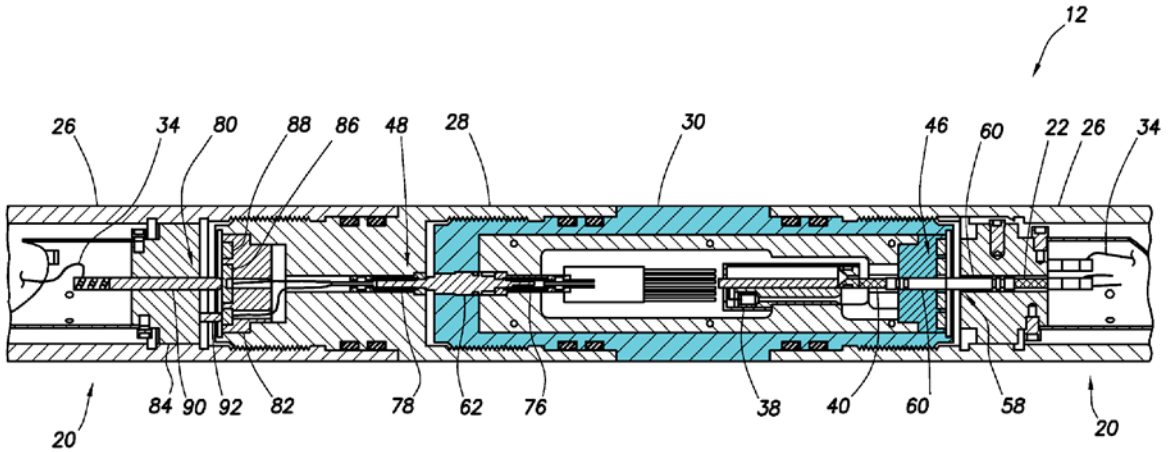


FIG. 5

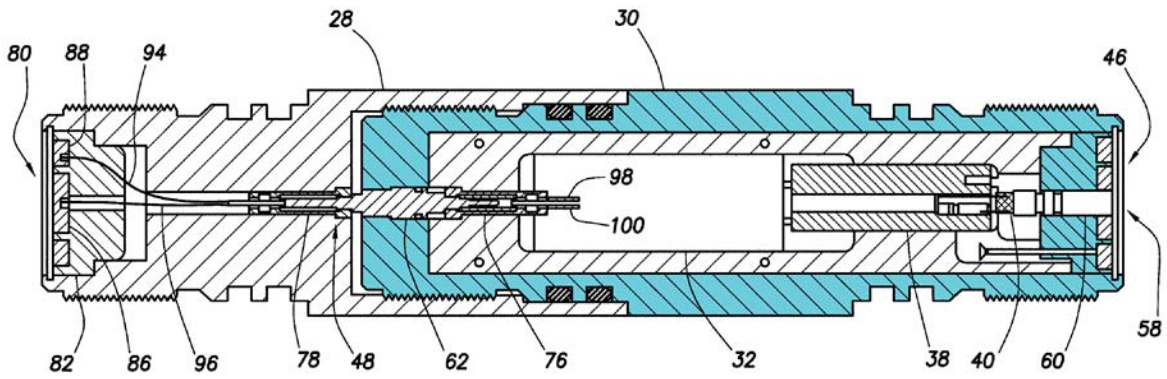


FIG. 7

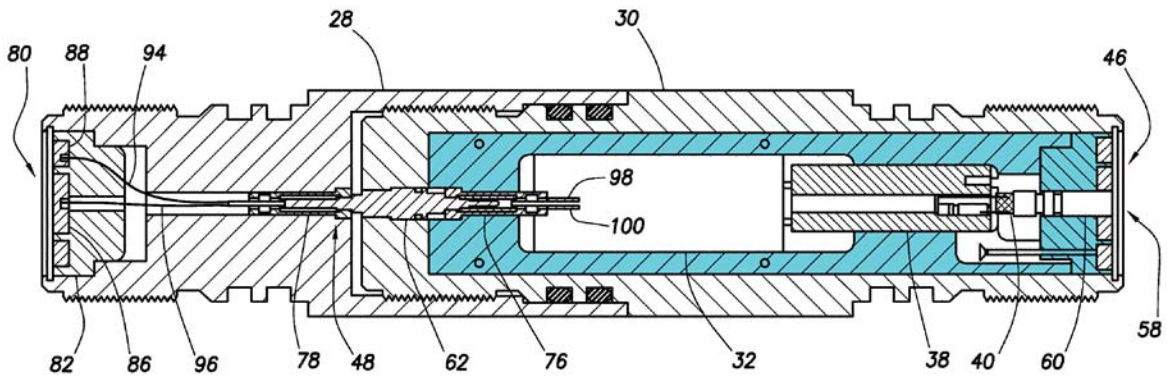


FIG. 7

(Ex. 1007, Parrott, ¶¶ 223-224.)

Therefore Schacherer teaches multiple examples of the claimed detonator body. (*Id.* at 223-225.)

**d) Harrigan teaches a detonator body**

Harrigan teaches a pre-wired initiator assembly module 125 that includes a detonator 301, which has its own body. (Ex. 1012, ¶¶ 0022-23, 0027, and FIGS. 1A,

2A, 3A, 3B & 4A; Ex. 1028, pp. 2, 4, 5, 7, FIGS. 2-4; Ex. 1007, Parrott, ¶¶ 226, 227.)

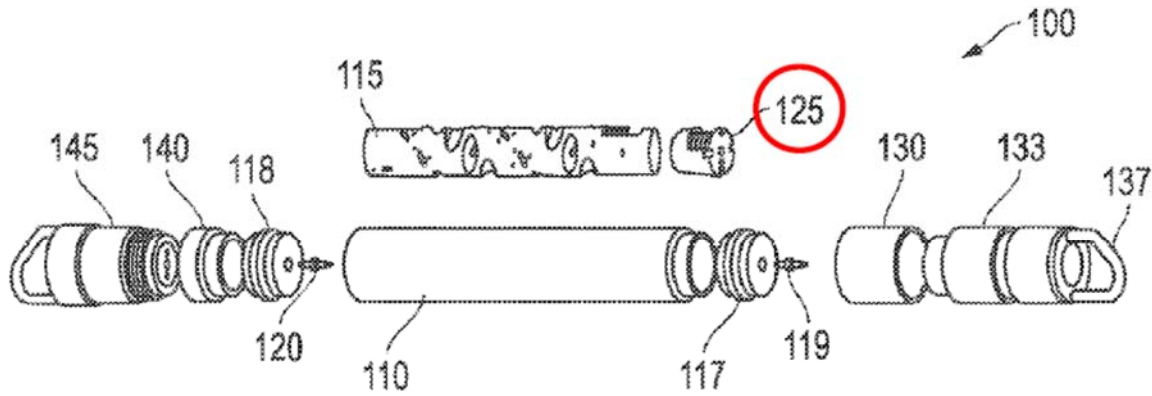


FIG. 1A

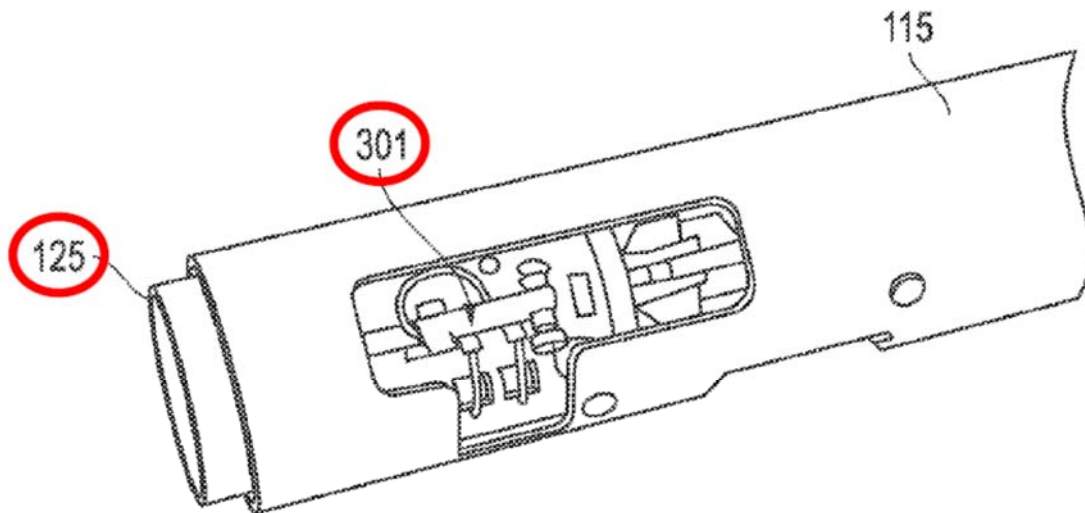


FIG. 3A

The initiator assembly module 125 and detonator 301 each teach the claimed detonator body. (Ex. 1007, Parrott, ¶ 227.)

e) Rogman teaches a detonator body

Rogman teaches initiator assemblies 112, 312, 313 which house detonator parts. (Ex. 1014, ¶¶ 0021, 0027, 0029, 0031, FIGS. 1-4; Ex. 1020, pp. 1-4, 7; Ex. 1007, Parrott, ¶¶ 228-231.)

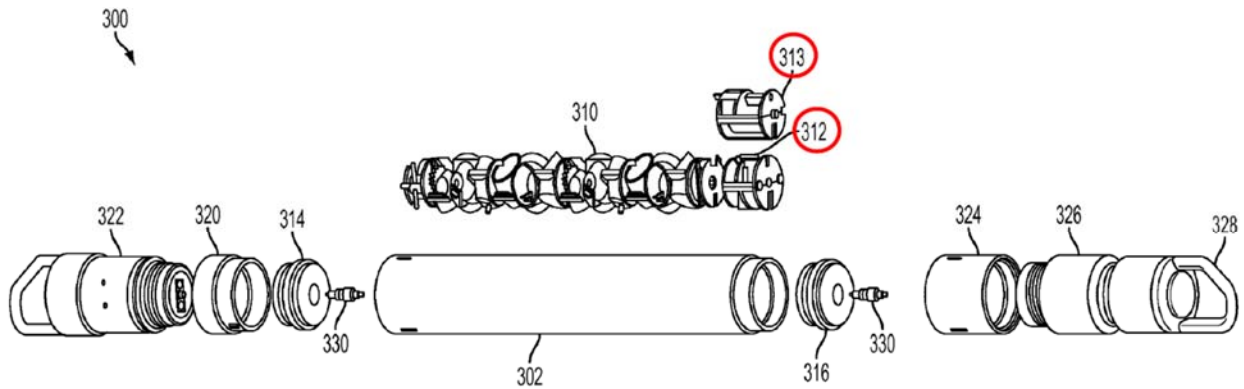


FIG. 3

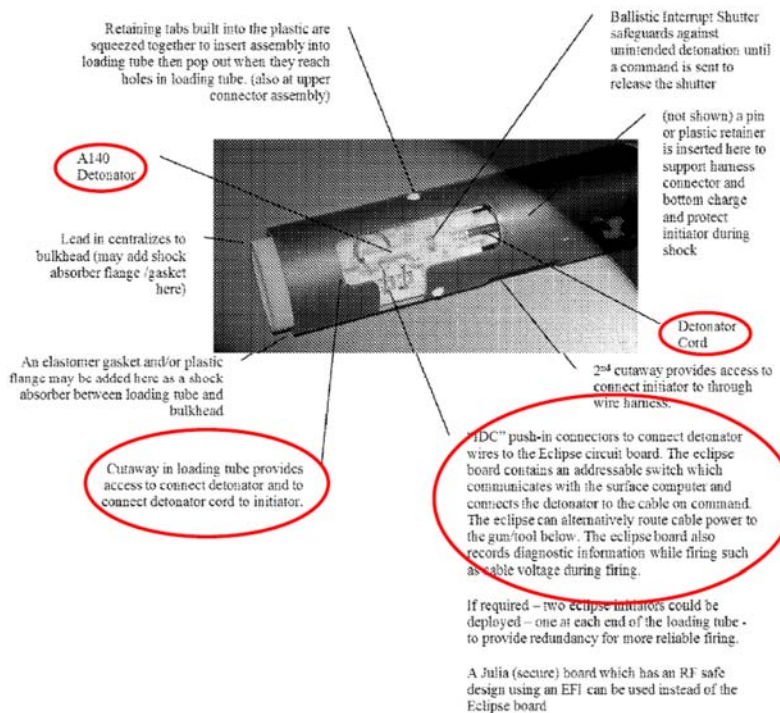


Fig. 4: Eclipse initiator

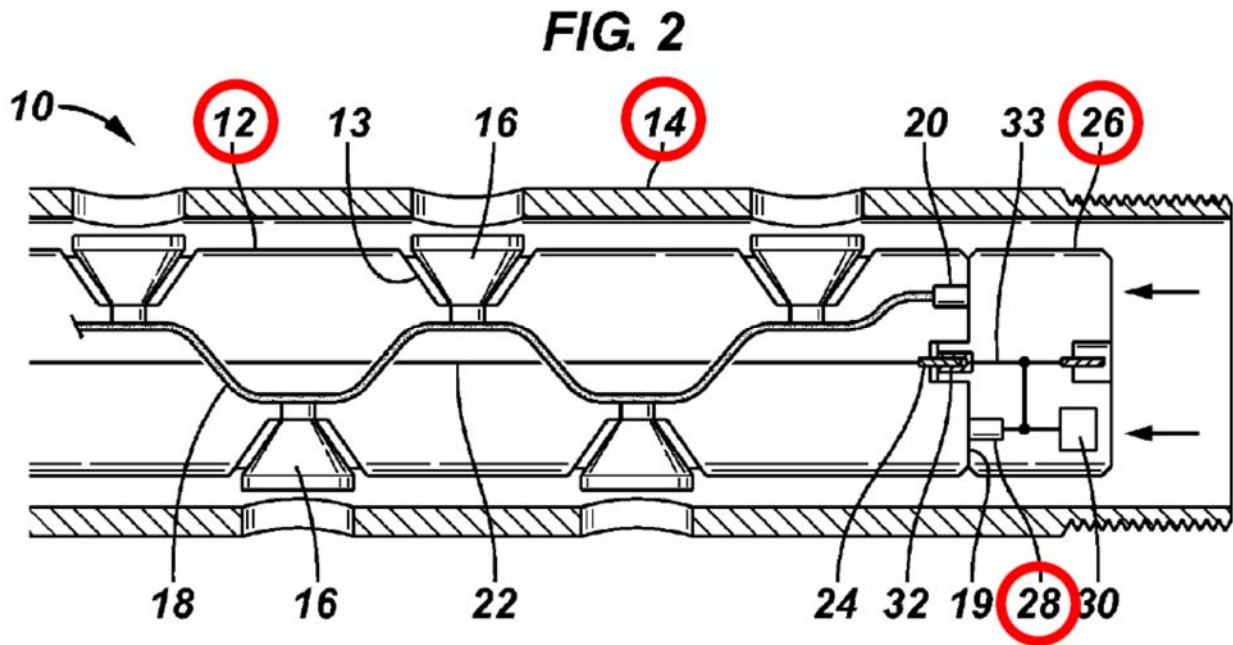


Detonator 402 of Rogman teaches an independent housing. (Ex. 1007, Parrott, ¶ 232.)

Rogman's initiator and detonator each teach the claimed detonator body. (*Id.* at 233.)

**f) Black teaches a detonator body**

Black teaches an arming device 26 that includes a detonator 28. (Ex. 1002, ¶¶ 0023-24, 0026, 0036, FIGS. 1, 2, 4, 6; Ex. 1007, Parrott, ¶ 235.)

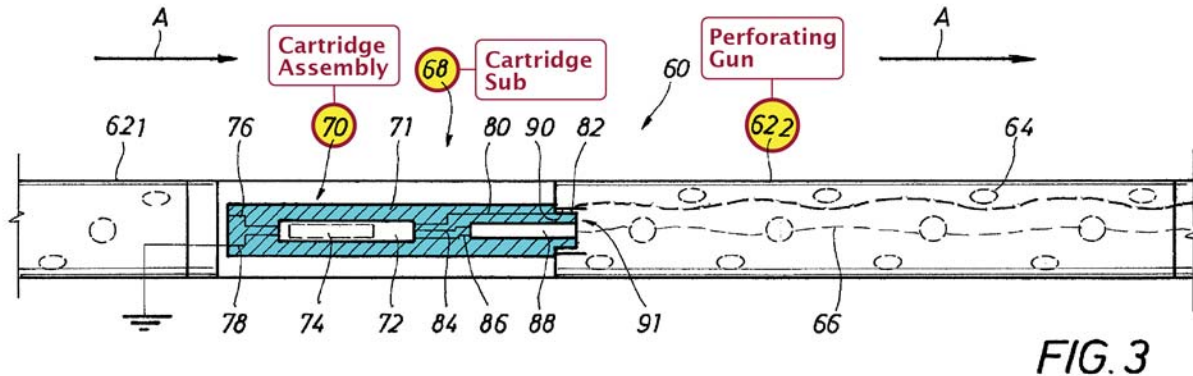
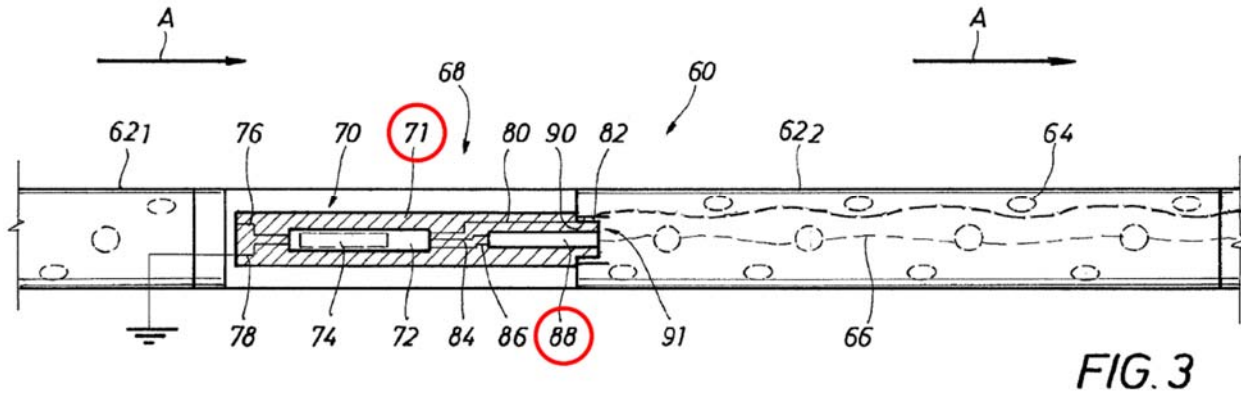


A POSITA would understand that Black's detonator 28 includes a body. (Ex. 1007, Parrott, ¶ 236.)

Both arming device 26 and detonator 28 teach the claimed detonator body. (*Id.* at 237.)

**g) Lanclos teaches a detonator body**

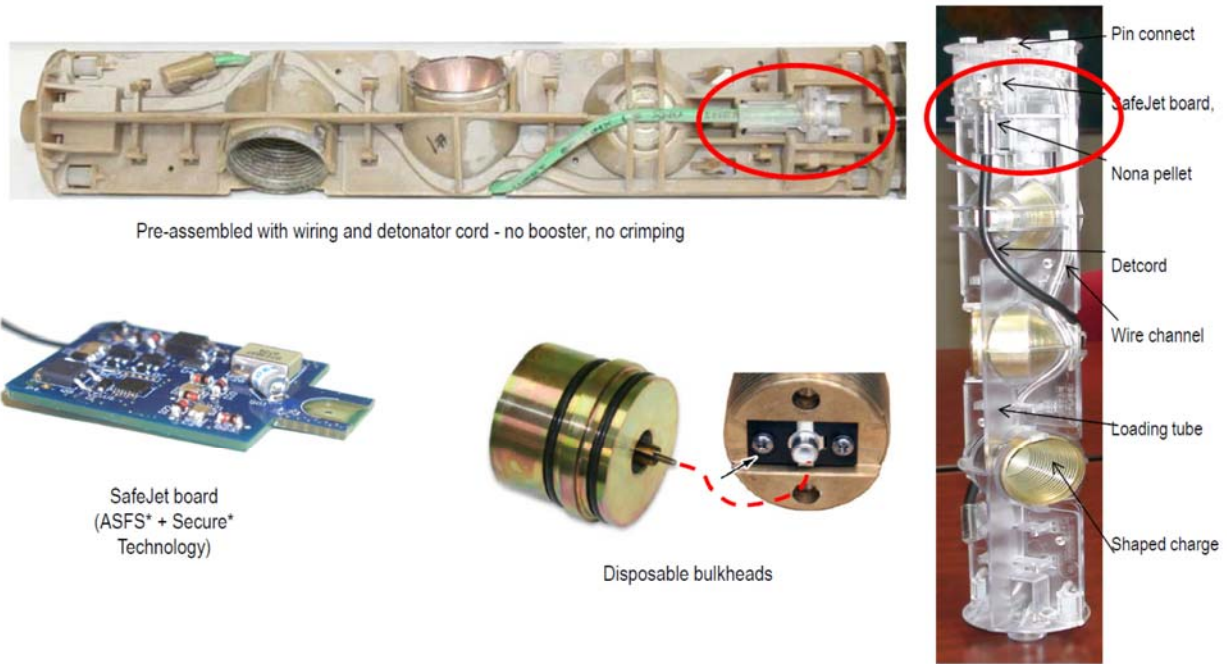
Lanclos teaches an elongated body 71 holding a detonator 88, which has its own body. (Ex. 1015, 4:61-5:1, 5:18-19, FIG. 3; Ex. 1007, Parrott, ¶ 238.)



Lanclos' detonator 88 and elongated body 71 each teach the claimed detonator body. (Ex. 1007, Parrott, ¶ 238.)

**h) EWAPS teaches a detonator body**

EWAPS illustrates and teaches, a plastic molded housing for detonator parts. (Ex. 1013, p. 010; Ex. 1007, Parrott, ¶ 234.)



Therefore, EWAPS teaches the claimed detonator body. (Ex. 1007, Parrott, ¶ 234.)

**i) Goodman teaches a detonator body**

Goodman teaches a detonator/initiator 15, 45, 47, including a body housing parts. (Ex. 1018, ¶¶ 0005-7, 0018-20, 0023-24, FIGS. 1-5; Ex. 1007, Parrott, ¶ 240.)

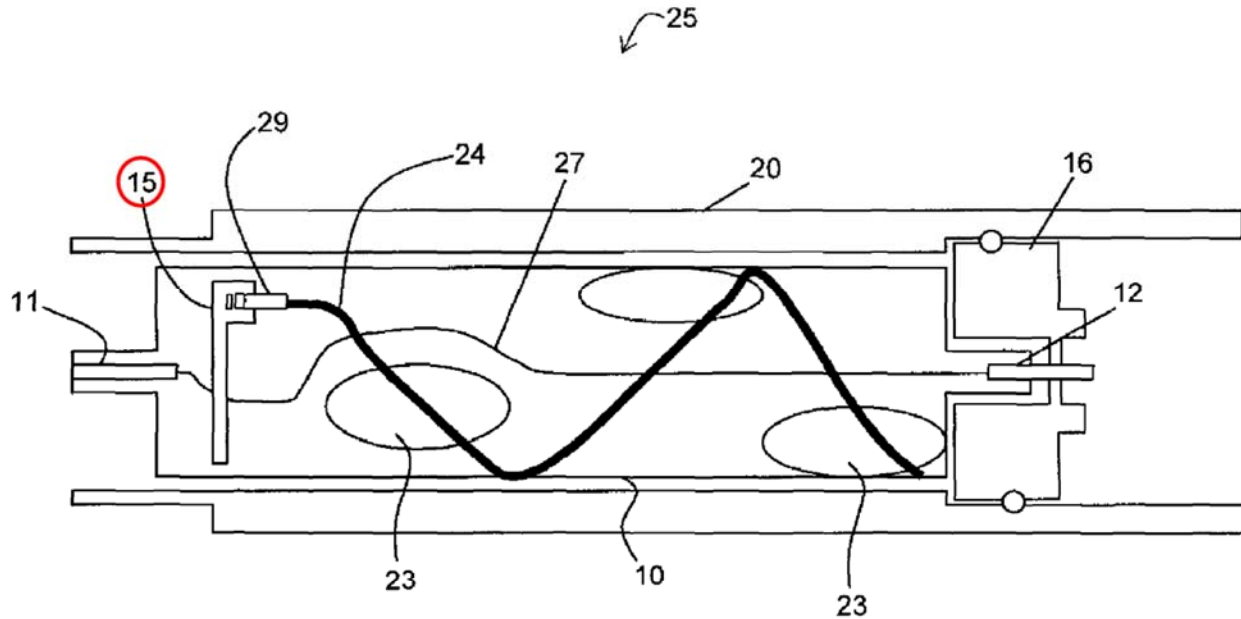


FIG. 2

Therefore, Goodman teaches the claimed detonator body. (*Id.* at 240.)

**2. Wireless Connectors**

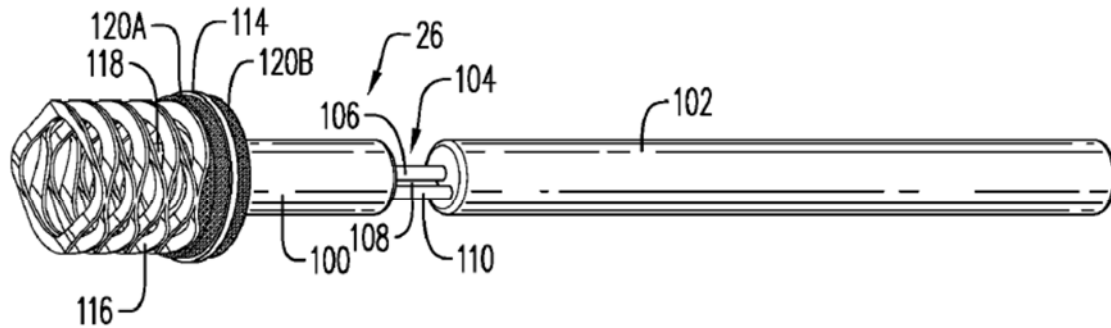
<b>Claim 1</b>	<b>Claim 9</b>	<b>Claim 13</b>
a wireless signal-in connector, a wireless through wire connector, and a wireless ground contact connector, and	a wireless signal-in connector; a wireless through wire connector; a wireless ground contact connector;	a wireless signal in connector, a wireless through wire connector, and a wireless ground contact connector, and
<b>Claim 8</b>	<b>Claim 12</b>	
wherein the detonator  is configured for being electrically contactably received	wherein the modular detonator  is configured for being electrically contactably received	

<p>within the perforating gun</p> <p>without using a wired electrical connection, and the wireless signal-in connector, the wireless through-wire connector, and the wireless ground contact connector together are configured to replace the wired electrical connection and to complete an electrical connection merely by contact.</p>	<p>within the gun assembly of the perforating gun system</p> <p>without using a wired electrical connection, and the wireless signal-in connector, the wireless through-wire connector, and the wireless ground contact connector together are configured to replace the wired electrical connection and to complete an electrical connection merely by contact.</p>
---	--

**a) Indefiniteness, lack of written description, and construction of wireless connectors**

The Patent does not use the word “wireless” outside of the claims or define or describe it. (Ex. 1007, Parrott, ¶ 253.) The Patent neither defines nor describes the terms “wireless signal-in connector,” “wireless through wire connector,” “wireless ground contact connector,” “through wire connector,” “signal-in connector,” or “ground contact connector.” (*Id.* at 254.) A POSITA would typically interpret the word “wireless” in the context of a perforating gun to refer to radio communications, such as wifi or Bluetooth, or perhaps inductive power transfer, such as is used for “wireless” charging of mobile phones. (*Id.* at 256.)

The Patent uses the term “signal-in” only to refer to “a signal-in wire 108” within detonator 26. (Ex. 1001, 8:6-19; Ex. 1007, Parrott, ¶ 257.)

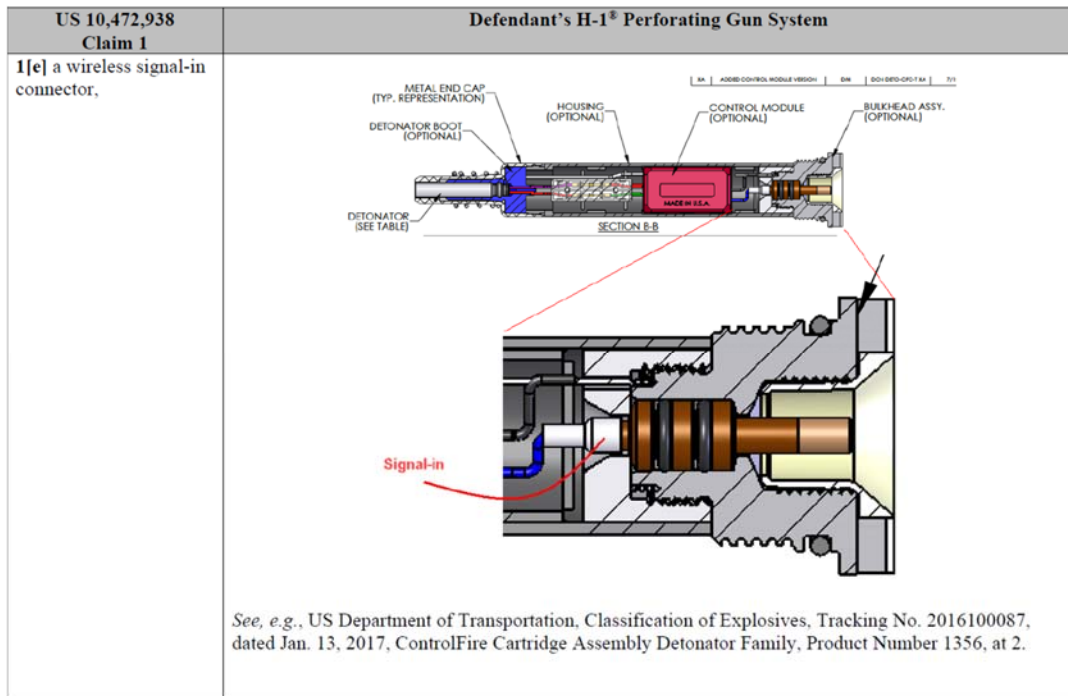
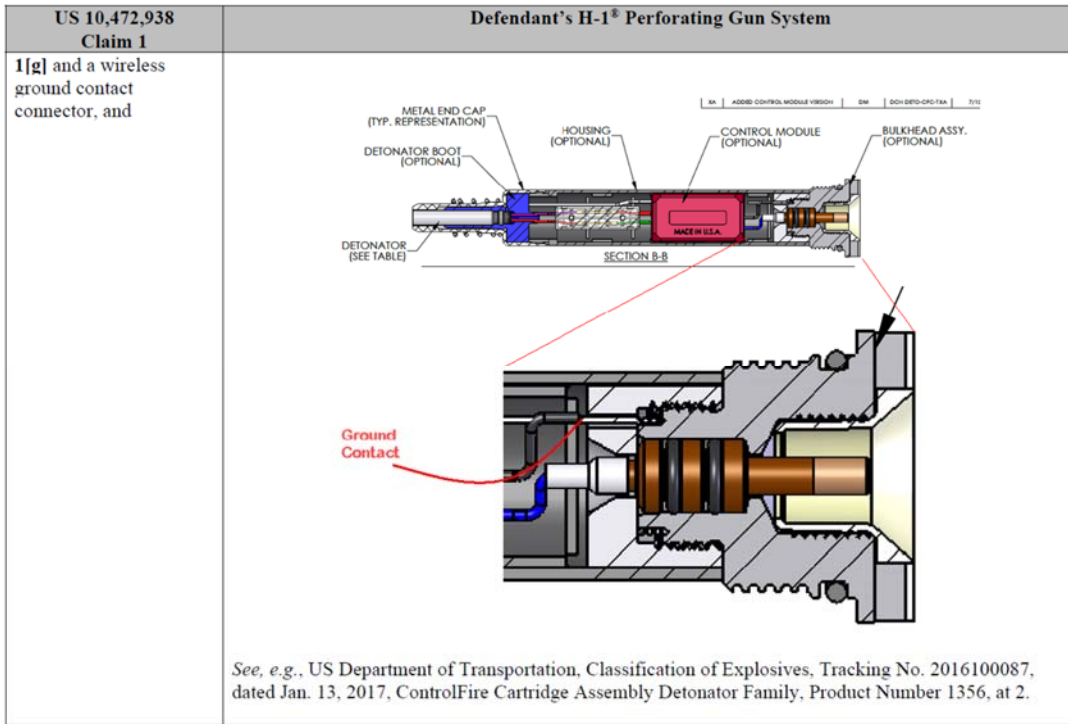


**FIG. 27**

The “through wire connector,” “signal-in connector,” and “ground contact connector” are described being connected to wires, making it difficult to understand how they could be “wireless.” (Ex. 1001, 8:13-19; Ex. 1008, File History, pp. 68-69, 80; Ex. 1007, Parrott, ¶¶ 259-60.)

Patent Owner argued that a detonator that included any wires could not be “wireless”, even when the term “wireless” had been defined in that patent. (Ex.1010, Final Written Decision, pp. 6-7, 13-14; Ex. 1007, Parrott, ¶¶ 261-62.) Claims 8 and 12 effectively incorporate the definition of “wireless” from that IPR, in which all original claims have been held anticipated. (Ex.1010, Final Written Decision, pp. 6-7, 13-14; Ex. 1007, Parrott, ¶ 263.) Therefore, if the term “wireless” is given the meaning Patent Owner gave it in ‘422 Patent, then the scope of Claims 1 and 8 is identical as are Claims 9 and 12, defying the doctrine of claim differentiation. (Ex. 1007, Parrott, ¶ 263.)

Adding to the confusion, Patent Owner has now alleged infringement of these “*wireless*” connector limitations *by wires*:



(Ex. 1006, pp. 020-021; Ex. 1007, Parrott, ¶¶ 264-65.)

Because the Patent does not provide a definition or explanation of the work “wireless” it could mean anything from wifi to a terminal on a wire. (Ex. 1007,

Parrott, ¶ 266.) The word “wireless” in the claims introduces ambiguity about the scope of the claims and causes them to fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention. *Id.* Therefore, all claims of the Patent are invalid as indefinite. *Id.*

Because the patent never describes a “wireless signal-in connector,” “wireless through wire connector,” “wireless ground contact connector,” “through wire connector,” “signal-in connector,” or “ground contact connector,” it does not reasonably convey to those skilled in the art that the inventor had possession of the claimed subject matter and all claims of the Patent are invalid for lack of written description. (*Id.* at ¶ 267.)

The Patent also does not provide meaningful description of what the terms “signal-in,” “through wire,” and “ground” mean when applied to connectors. (*Id.* at ¶ 268.) The only description of those terms applied to connectors is that the connectors are “connected to” or are “for connecting” similarly labeled wires. (Ex. 1001, 8:6-19; Ex. 1007, Parrott, ¶ 268.) This issue is further confused by Claims 2, 7, 9, 11, 13, 15 and 20 adding the similarly labeled wires. *Id.*

If the connectors are not defined by the wires they are connected to, which seems possible since they are “wireless”, then the labels “signal-in,” “through wire,” and “ground” have no meaning. (Ex. 1001, 11:51-54; Ex. 1007, Parrott, ¶ 269.) If the terms “signal-in,” “through wire,” and “ground” are given meaning in the



wireless connector elements, then Claims 1, 2, and 7 would have the same scope, as would Claims 9 and 11 and 13, 15, and 20. (Ex. 1007, Parrott, ¶ 269.) Such overlapping claiming violates the principles of claim differentiation. (*Id.* at ¶ 269.)

Because of the difficulty presented to a POSITA in deciphering the terms, “wireless signal-in connector,” “wireless through wire connector,” and “wireless ground contact connector,” the claims are indefinite. (*Id.* at ¶ 270.)

A POSITA’s best guess as to the meaning of the claim element “a wireless signal-in connector, a wireless through wire connector, and a wireless ground contact connector,” and the similar language in Claim 9 is three electrical contacts. (*Id.* at ¶ 271.)

A POSITA would not have an understanding of what “without using a wired connection” or “configured to replace the wired electrical connection” means. (*Id.* at ¶¶ 272-73.) The Patent does not describe what a “wired electrical connection” is, or what would constitute “without using a wired electrical connection” or “configured to replace the wired electrical connection.” *Id.* The Patent also provides no information on what “wired electrical connection” the detonator is “configured to replace.” *Id.*

Based on unresolved ambiguity of these terms, a POSITA could not determine the scope of Claim 8 and 12 with reasonable certainty. (*Id.* at ¶ 275.)

The Patent discusses what a “gun assembly” is when it twice says: “assembling a plurality of the stackable charge holders in a predetermined phase to form a first gun assembly.” (Ex. 1001, 2:59-60, 9:47-48; Ex. 1007, Parrott, ¶ 276.) The specification says “*each gun assembly unit having all the components of a gun assembly,*” without identifying those components. (Ex. 1001, 7:63-67; Ex. 1007, Parrott, ¶ 278.) Because a POSITA is left guessing as to what a gun assembly is, Claims 9-12 are indefinite. (Ex. 1007, Parrott, ¶ 279.)

A POSITA’s best guess as to the meaning of the limitations of Claims 8 and 12 is that the detonator can be electrically connected to a perforating gun without the need to connect or attach wires directly to each other. (Ex. 1007, Parrott, ¶ 281.)

**b) Common knowledge includes wireless connectors**

A POSITA’s common knowledge would include the use of addressable switches with detonators and their requirement for three conductors providing an input path, a ground or return path, and a communications path to the next detonator, as also taught by U.S. Patent Nos. 8,689,868 and 8,576,090 to Hunting Titan, Inc. (Ex. 1023, FIGS. 13, 15, 19A; Ex. 1024, FIGS. 13, 15, 19A; Ex. 1007, Parrott, ¶ 285.) A POSITA’s common knowledge includes the use of electrical contacts to replace “wired” connections. (Ex. 1007, Parrott, ¶ 283.) Common knowledge teaches the “wireless” connectors of Claims 1, 8, 9, 12, and 13. *Id.*

**c) Schacherer teaches wireless connectors**

Schacherer teaches a variety of “wireless” electrical connectors connecting selective firing modules 32, including in rotary electrical connections 46, 80, rotary electrical connectors 48, 82, electrical connectors 76, and electrical couplers 62, 68, 78. (Ex. 1004, 2:57-60, 5:17-36, FIGS. 3, 4, 5, 7; Ex. 1007, ¶¶ 285-86.)

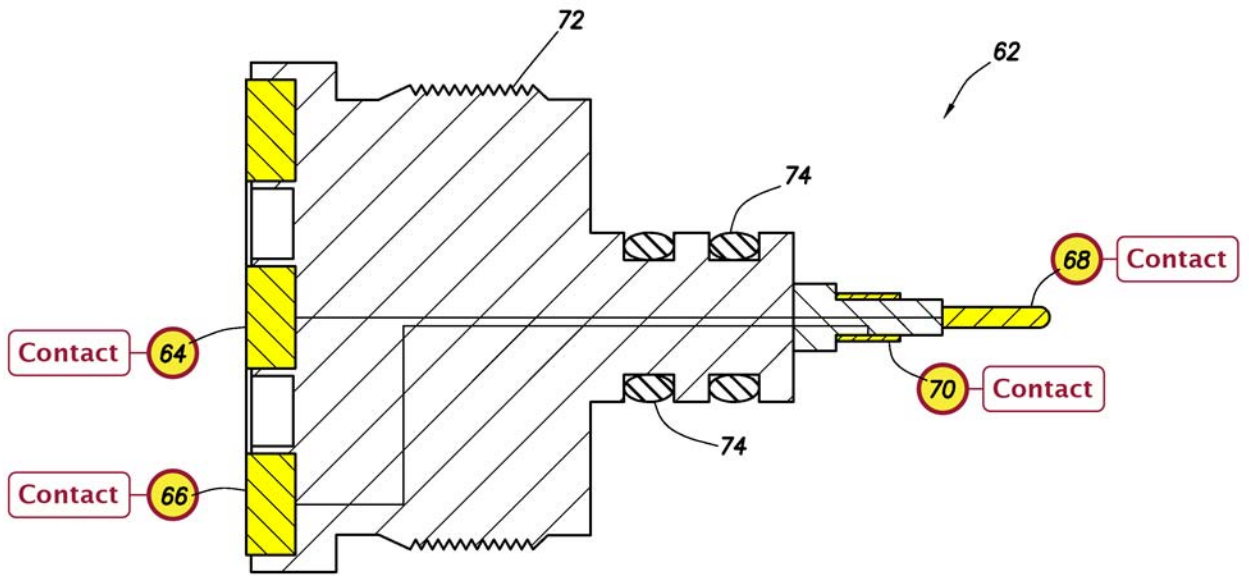


FIG.3

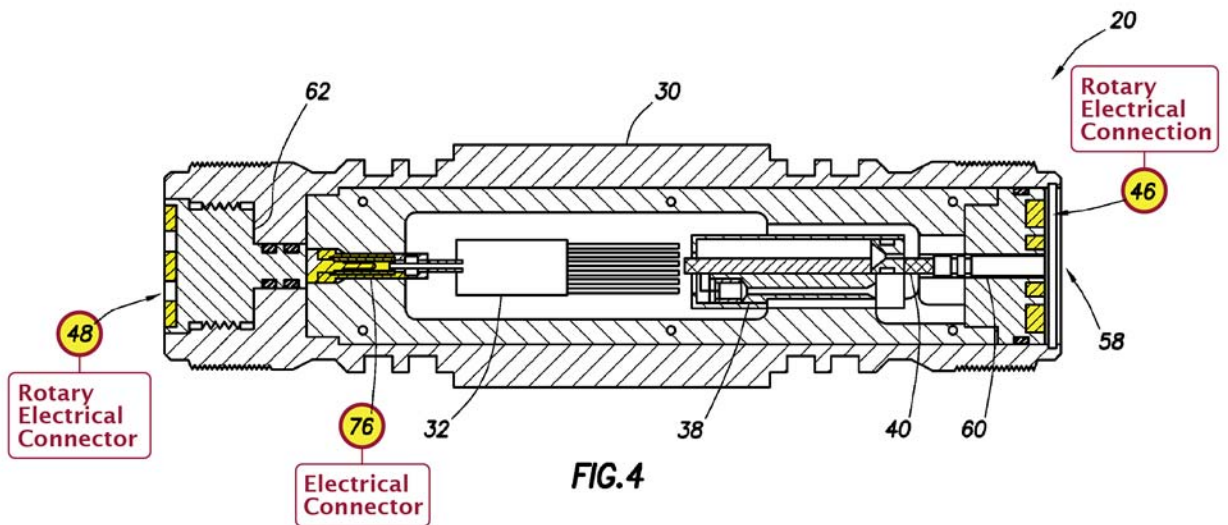
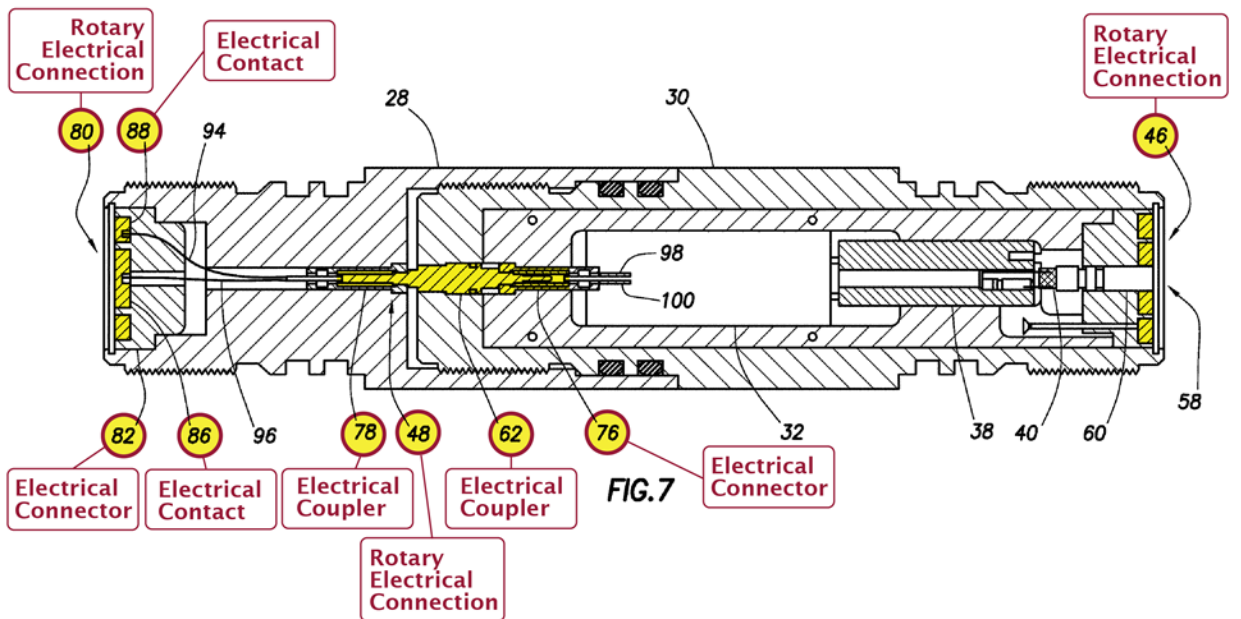
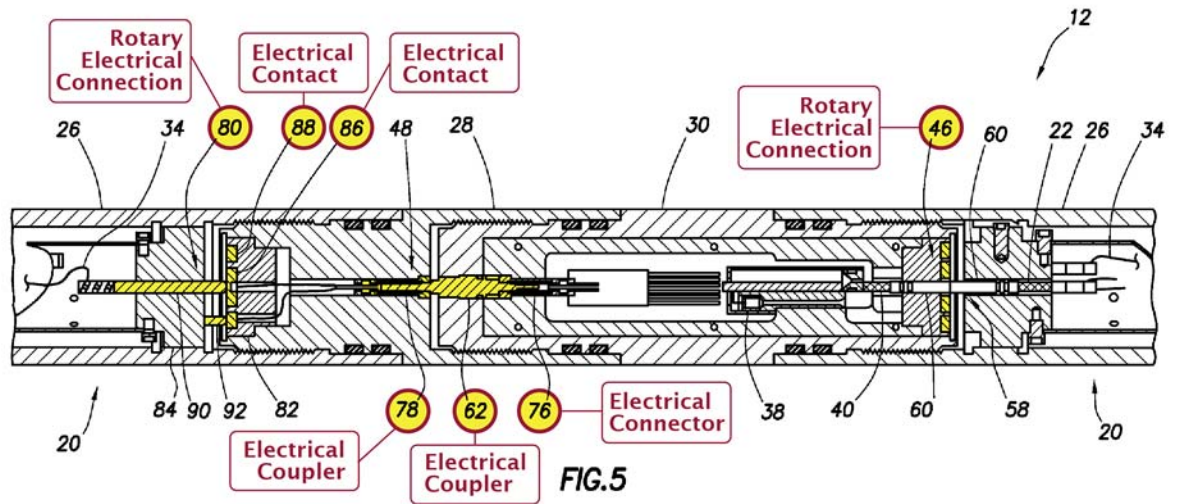


FIG.4

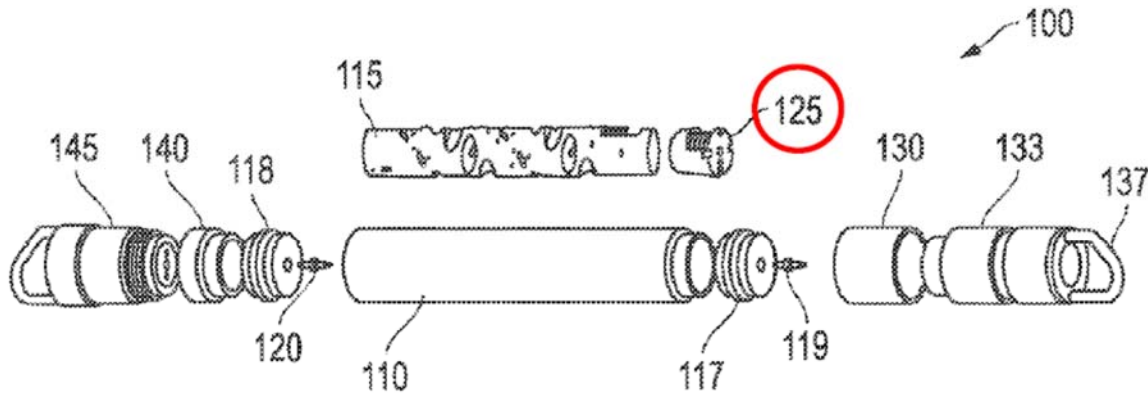


(Ex. 1007, Parrott, ¶¶ 285-87.) Schacherer teaches that conductors 94, 96, 98, and 100 carry a signal and ground that pass through the connectors. (Ex. 1004, 6:13-22; Ex. 1007, Parrott, ¶ 288.)

Therefore, Schacherer teaches the claimed “wireless” connectors. (Ex. 1007, Parrott, ¶ 289.)

**d) Harrigan teaches wireless connectors**

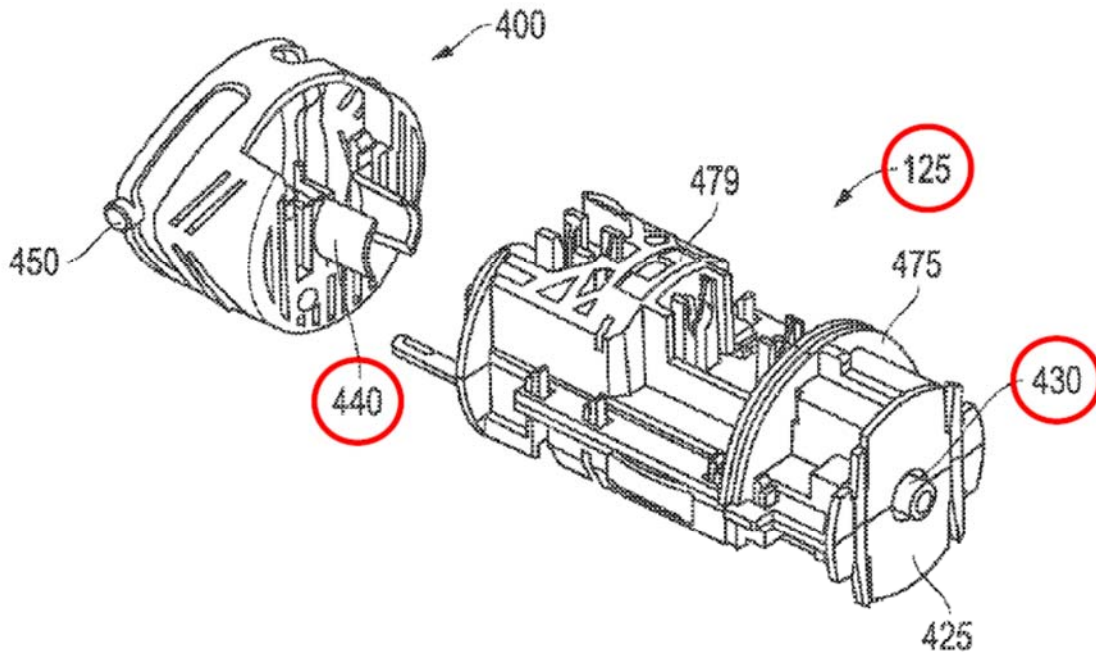
Ex. 1012, Harrigan teaches a pre-wired initiator assembly module 125 that is “plugged into” a loading tube 115 and electrically coupled to a modular feedthrough with a connector.” (Ex. 1012, Abstract, ¶¶, 0015-16, 0022, 0024, 0033, FIGS. 1A, 2A, 3A, 3B; Ex. 1007, Parrott, ¶ 290.)



*FIG. 1A*

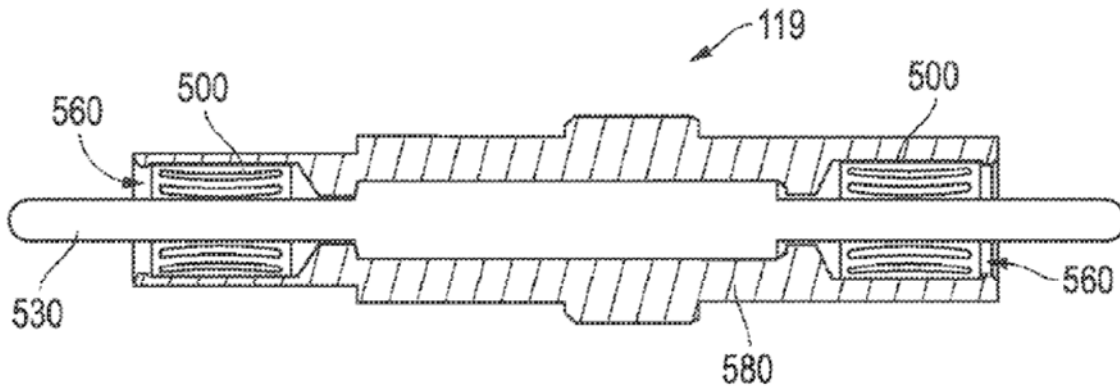
Harrigan teaches that these electrical connectors “ultimately provide electrically connectivity between internal components such as the initiator assembly module 125 and communications from surface,” and reduce the number of electrical connection made at the oilfield. (Ex. 1012, ¶¶ 0008-10, 0024; Ex. 1007, Parrott, ¶ 290.) Harrigan teaches details of the feedthrough electrical contacts and the initiator 125 would have complementary electrical contacts. (Ex. 1012, ¶ 0025, FIGS. 5A-5B; Ex. 1028, pp. 5-6, FIG. 5; Ex. 1007, Parrott, ¶¶ 290, 292.)

Harrigan teaches electrical connections 430, 440 on both ends of initiator 125 for connection to a feedthrough 119 and a loading tube 115. (Ex. 1012, ¶¶ 0039, 0042, FIGS. 4A, 4B; Ex. 1028, pp. 2, 4, 7, FIGS. 2, 3, 6; Ex. 1007, Parrott, ¶ 291.)



*FIG. 4A*

Harrigan teaches a two conductor coaxial connector, like an RCA connector. (Ex. 1012, ¶¶ 0043-45, FIGS 4A, 4B, 5A, 5B; Ex. 1007, Parrott, ¶ 293.)



*FIG. 5A*

Contact to RCA connector is made through contact springs that are protected by feedthru body

Feedthru pin is over-molded with plastic to create a robust yet cheap connector



Feedthru is composed of two pieces of brass that are pressed into each other, allowing it to withstand pressure from either direction

**Fig. 5: Feedthru**

Harrigan teaches a pre-wired initiator assembly 125 connected to a loading tube with a feed through wire (communicative line) through electrical connectors. (Ex. 1012, ¶¶ 0022, 0027, 0032, Claims 12, 15; Ex. 1007, Parrott, ¶ 294.) Harrigan's

initiator requires at least three electrical contacts for a signal-in to the initiator, a signal through the initiator to a next initiator, and a ground connection to function.

(Ex. 1007, Parrott, ¶ 295.)

Therefore, Harrigan teaches the claimed “wireless” connectors. (Ex. 1007, Parrott, ¶ 296.)

**e) Rogman teaches wireless connectors**

Rogman teaches an initiator assembly 112, 312, 313 connected to a power cable 502 and bulkheads 114, 116 with RCA connectors to communicate. (Ex. 1014, ¶¶ 0019, 0031, 0033-36, FIG. 3; Ex. 1020, pp. 1, 2, 4, 5, 7, 8; Ex. 1007, Parrott, ¶¶ 297-98.)

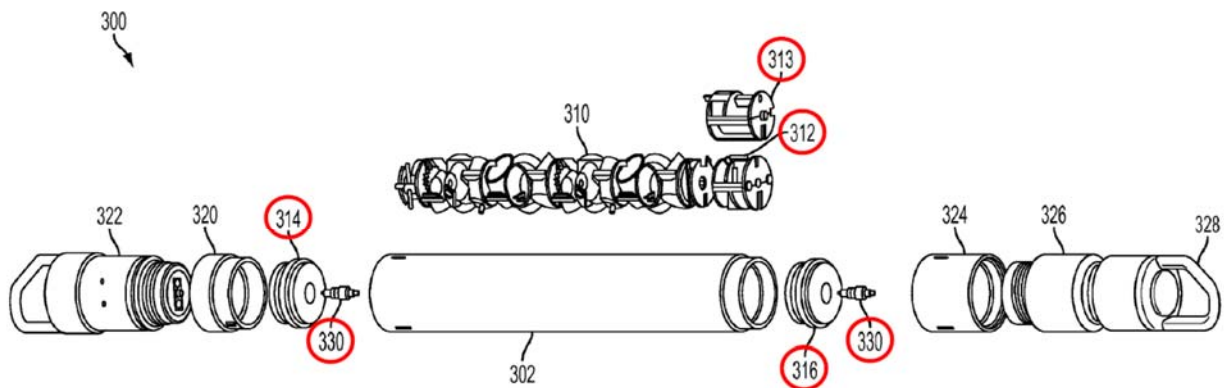


FIG. 3



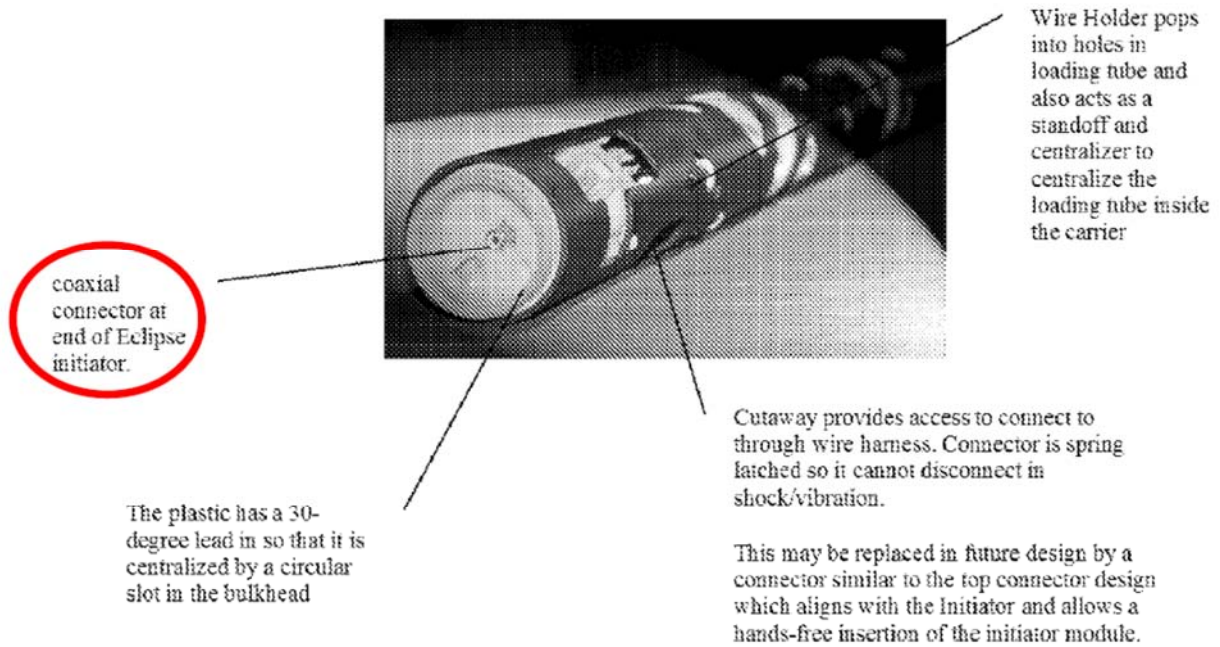


Fig. 5: End of loading tube

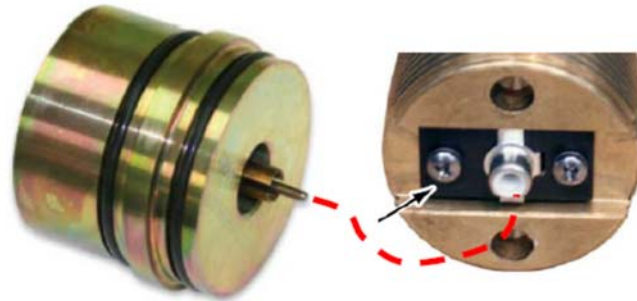
Rogman’s power cable and RCA jacks would provide for a signal-in to the initiator, a signal through the initiator to a next initiator, and a ground connection without the need to manually attach wires. (Ex. 1007, Parrott, ¶¶ 298-99.)

Therefore, Rogman teaches the claimed “wireless” connectors. (*Id.* at 300.)

**f) EWAPS teaches wireless connectors**

EWAPS teaches a signal-in (hot), ground, and feed-thru wires associated with an addressable switch and detonator connected to coaxial RCA connectors on each end of a loading tube containing an addressable detonator. (Ex. 1013, pp. 6, 9-10;

Ex. 1007, Parrott, ¶ 301.) These electrical connections are completed by attaching or screwing one gun assembly to the next. *Id.*



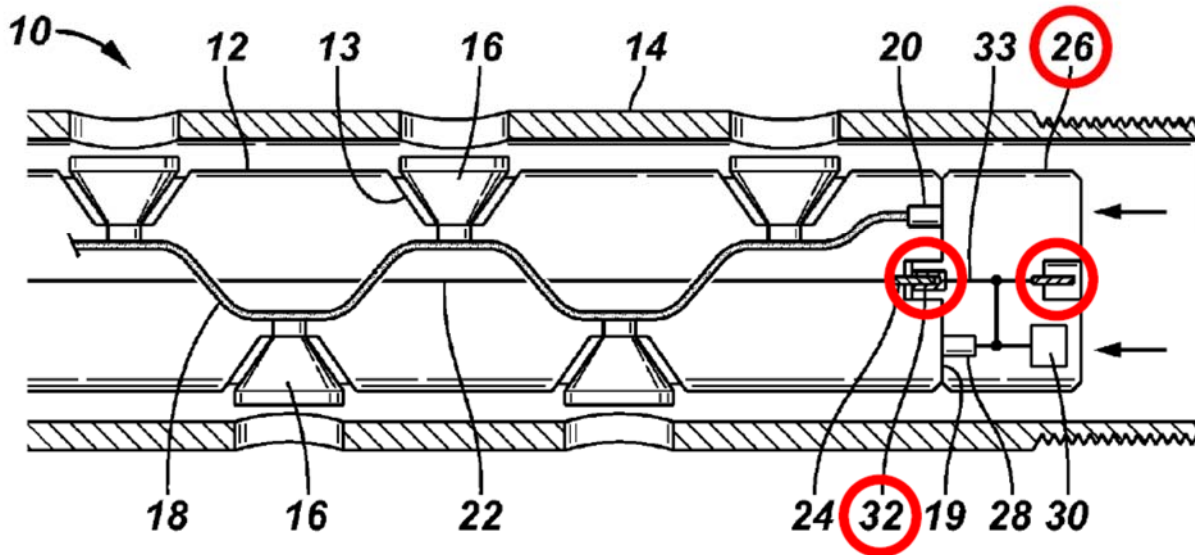
Disposable bulkheads

Therefore, EWAPS teaches the claimed “wireless” connectors. (Ex. 1007, Parrott, ¶ 302.)

**g) Black teaches wireless connectors**

Black teaches an arming device 26, including a detonator 28, firing electronics 30, and electrical connector 32 and connector another opposite it. (Ex. 1002, ¶¶ 0024-26, FIGS. 1, 2, 6-9; Ex. 1007, Parrott, ¶ 303.) Black teaches that electrical connectors of arming device 26 can be two conductor RCA connectors. (Ex. 1002, ¶ 29; Ex. 1007, Parrott, ¶¶ 303-04.)

**FIG. 2**



A POSITA would read Black's electrical connectors 32, 24 and conductors 33, 22 as containing paired conductors and contacts as would be used with the disclosed RCA connectors and necessary to function. (Ex. 1007, Parrott, ¶ 305.)

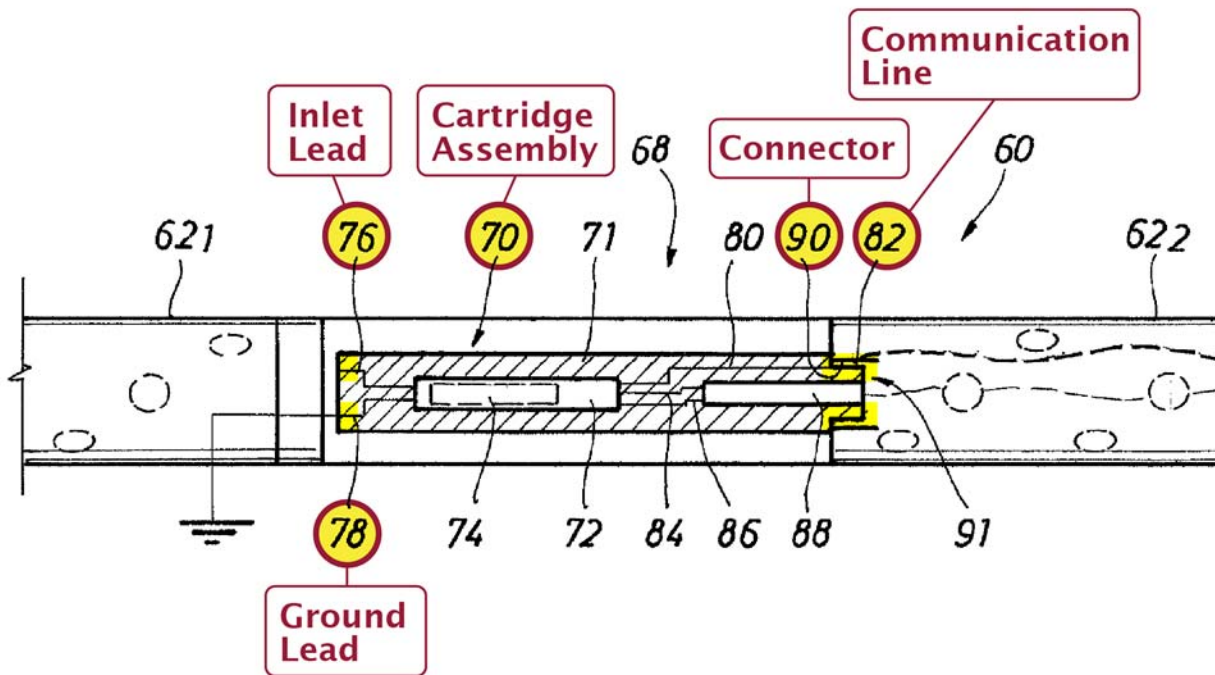
The electrical contacts on the arming device 26, provide for a signal-in to the arming device 26, detonator 28, and firing electronics 30, a signal through the arming device, to a next arming device, and a ground connection to function. (*Id.* at ¶ 306.) The detonator connections of Black are completed with no manual attachment of wires required. (Ex. 1002, ¶¶ 37-41, Ex. 1007, Parrott, ¶ 306.)

Therefore, Black teaches the claimed "wireless" connectors. (Ex. 1007, Parrott, ¶ 307.)

**h) Lanclos teaches wireless connectors**

Lanclos teaches a cartridge sub 68 with electrical connector 90 including “a disc like flange member” and “spring connector,” or “rod and pin connector” connecting the cartridge sub to a perforating gun. (Ex. 1015, Lanclos, 5:35-36, 5:41-47, 66:19-37, 6:38-65; Ex. 1007, Parrott, ¶¶ 308-10.) Lanclos teaches the use of such connectors “on the upstream and downstream sides of the cartridge sub 68.” (Ex. 1015, Lanclos, 6:38-39, 6:48-50; Ex. 1007, Parrott, ¶ 310.)

Lanclos teaches that the connectors lead to “an inlet lead 76, a ground lead 78 and a supply lead 80.” (Ex. 1015, 5:1-11, 5:41-47; Ex. 1007, Parrott, ¶¶ 308-09.)



Therefore, Lanclos teaches the claimed “wireless” connectors. (Ex. 1007, Parrott, ¶ 312.)

**i) Goodman teaches wireless connectors**

Goodman teaches a detonator/initiator 15, 45, 47 having electrical connectors for engaging with receptacle 18 and an electrical receptacle 17 for connecting connectors 11, 12, 43, and 44. (Ex. 1018, ¶¶ 0005-7, 0018-20, 0023-24, FIGS. 1-5; Ex. 1007, Parrott, ¶ 313.)

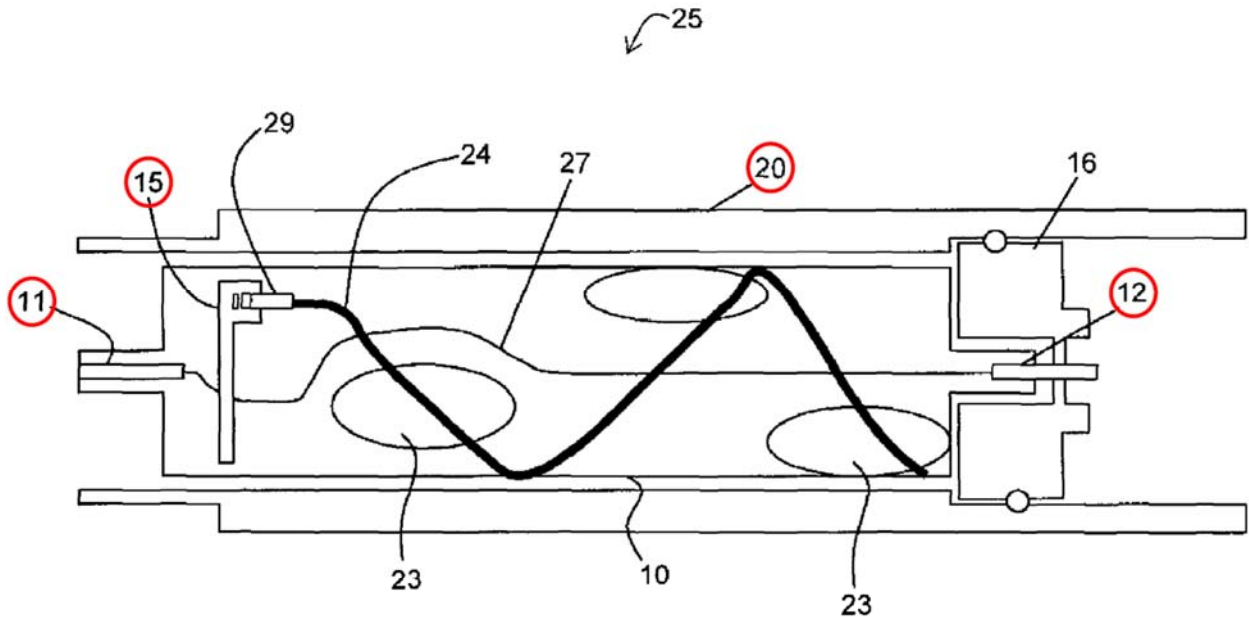


FIG. 2

Goodman's addressable detonator would require at least 3 electrical contacts providing for a signal-in to the initiator, a signal through the initiator to a next initiator, and a ground connection to function. (Ex. 1007, Parrott, ¶ 314.) A POSITA would read Goodman's electrical connectors 11, 12, 43, and 44 and wiring 27 and

46 as each containing paired conductors as would be used with RCA connectors. *Id.* A POSITA would understand Goodman teaches a signal-in electrical contact and electrical path to the addressable switch, a signal out, or through electrical contact and electrical path from the addressable switch to a next perforating gun, and a ground contact and electrical path from the addressable switch to complete the necessary communications circuit to function. *Id.*

Therefore, Goodman teaches the “wireless” connectors of Claims 1, 8, 9, 12, and 13. (*Id.* at 315.)

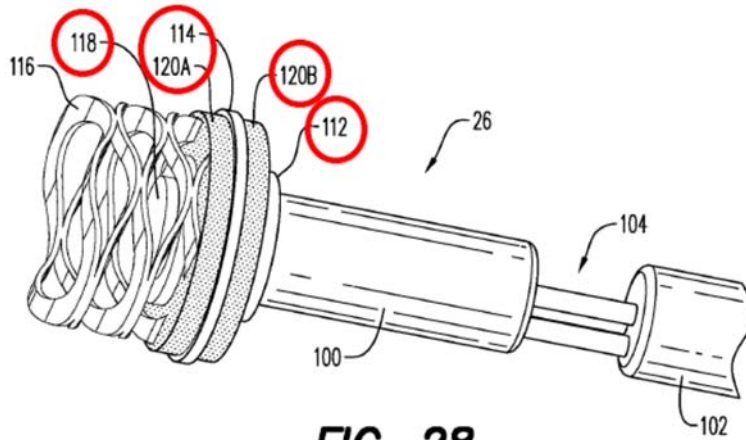
### 3. *An Insulator*

<b>Claim 1</b>	<b>Claim 9</b>	<b>Claim 13</b>
an insulator electrically isolating the wireless signal-in connector from the wireless through wire connector	an insulator electrically isolating the wireless signal-in connector from the wireless through wire connector	an insulator electrically isolating the wireless signal-in connector from the wireless through wire connector

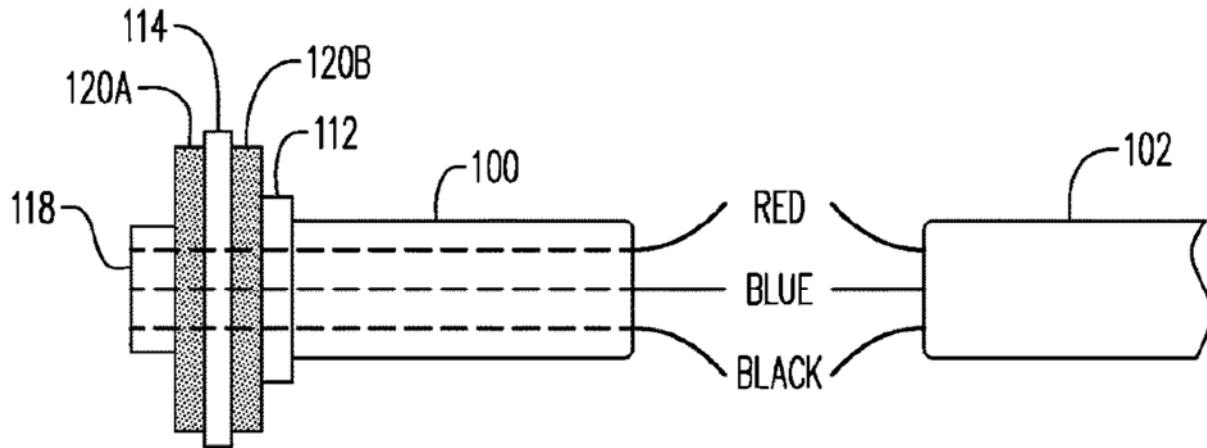
#### a) **Indefiniteness, lack of written description, and construction of an insulator**

The Patent never describes “an insulator electrically isolating the wireless signal-in connector from the wireless through wire connector,” instead describing insulators “for the purpose of insulating the detonator head 100 and the detonator wires 104 from surrounding components.” (Ex. 1001, 8:6-22; Ex. 1007, Parrott, ¶ 332.) FIG. 28 of the Patent shows insulating elements 120A, 120B between a ground

contact element 114 and a bulkhead connector element 118 and a through wire connector element 112, respectively. *Id.*



An “electrical schematic view of a detonator,” shows all three of the wires 104 continuing past insulating elements 120A and 120B to the bulkhead connector element 118. (Ex. 1001, 4:60-62, 8:6-22, FIG. 35A; Ex. 1007, Parrott, ¶ 333.) If an insulator is supposed to separate item 118 from item 112, then the only drawing in the Patent that alleges to show the inside of the detonator, is misleading. (Ex. 1007, Parrott, ¶ 333.)



**FIG. 35A**

Because the Patent never describes an insulator electrically isolating the wireless signal-in connector from the wireless through wire connector, it does not provide a written description of what is claimed. (*Id.* at 334.)

For the reasons discussed above, the terms “wireless signal-in connector” and the “wireless through wire connector,” introduce uncertainty into the claims, causing the claims to fail to inform those skilled in the art about the scope of the invention with reasonable certainty. (*Id.* at 335.)

A POSITA’s best guess interpretation would be an insulator positioned between two electrical contacts of a detonator. (*Id.* at 336.)

**b) Common knowledge includes an insulator**

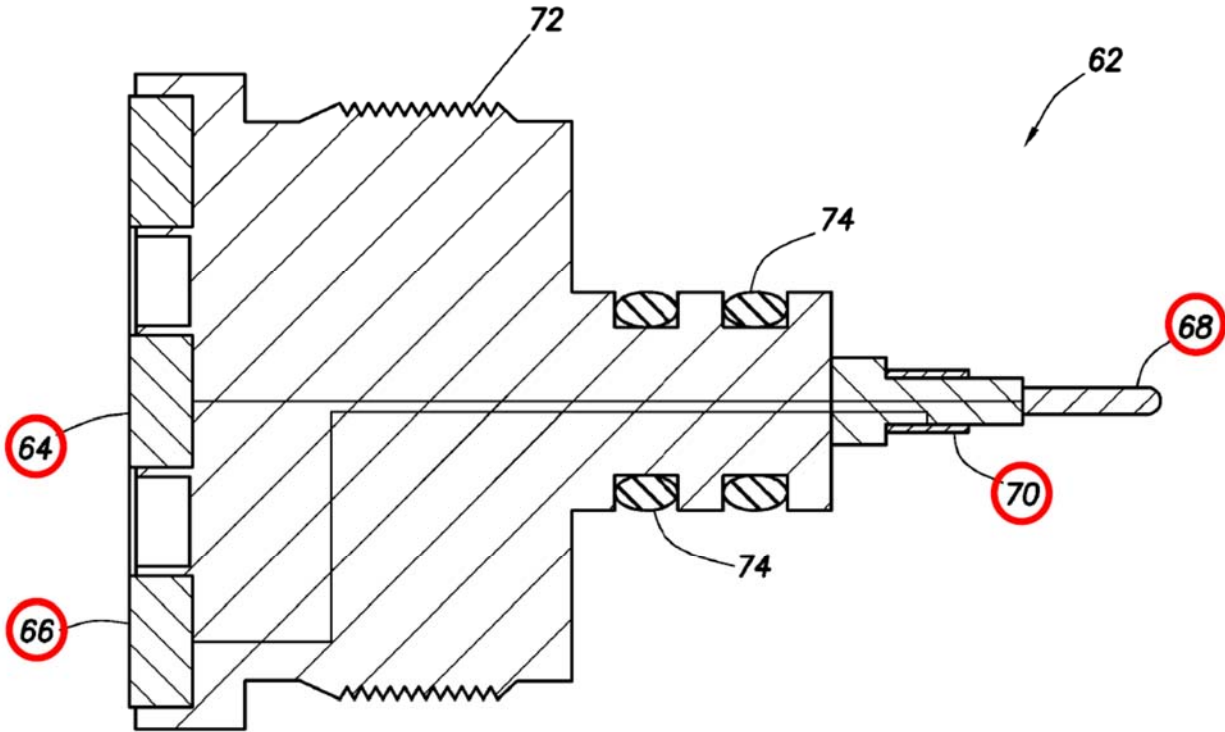
A POSITA’s common knowledge would include the separation of all electrical contacts by insulators as claimed. (*Id.* at 337-39.)



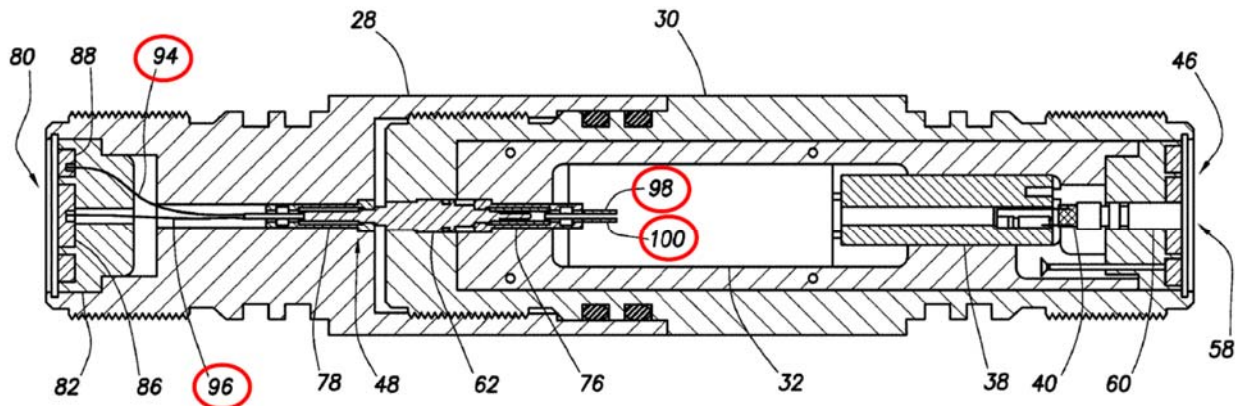
**c) Schacherer teaches an insulator**

Schacherer's contacts 64 and 68 must be electrically insulated from 66 and 70 and conductors 94 and 98 must be electrically insulated from 96 and 100 to function.

(Ex. 1004, 5:17-21, 6:13-18, FIGS. 3, 7; Ex. 1007, Parrott, ¶¶ 340-41.)



**FIG. 3**



**FIG. 7**

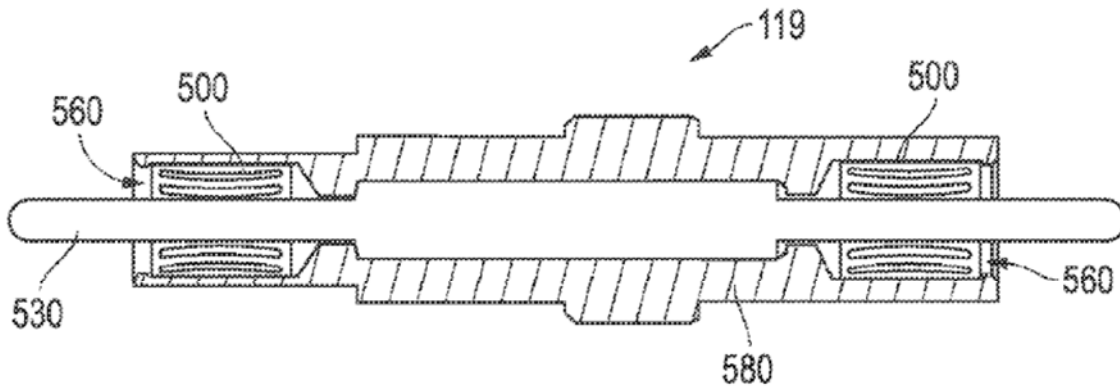
The line-in contacts on one end of the connector 30 would be insulated from the contacts on the other end of connector 30, and insulated through the body of rotary electrical connection 46 and electrical coupler 62. (Ex. 1007, Parrott, ¶ 341.) It is also inherent that the structure located between the contact 70 and contact 68 is an insulator. (Ex. 1004, FIG. 3; Ex. 1007, Parrott, ¶ 341.) The bodies of these items must have electrical insulators in order for electrical contacts in those items to function. (Ex. 1007, Parrott, ¶ 342.)

These insulator teachings in Schacherer are confirmed by the PTAB and the Examiner. (Ex. 1010, Final Written Decision, ¶¶ 47-52; Ex. 1008, File History, pp. 83-84; Ex. 1007, Parrott, ¶ 343.)

A POSITA would recognize that Schacherer teaches the claimed insulator. (Ex. 1007, Parrott, ¶ 342.)

**d) Harrigan teaches an insulator**

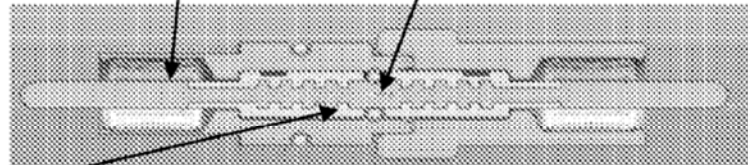
Harrigan teaches an insulator between contacts of a coaxial connector, such as an RCA connector, including molding plastic over a central pin. (Ex. 1012, ¶¶ 0043-45, FIGS 4A, 4B, 5A, 5B; Ex. 1028, FIG. 5; Ex. 1007, Parrott, ¶¶ 344-46.)



*FIG. 5A*

Contact to RCA connector is made through contact springs that are protected by feedthru body

Feedthru pin is over-molded with plastic to create a robust yet cheap connector



Feedthru is composed of two pieces of brass that are pressed into each other, allowing it to withstand pressure from either direction

**Fig. 5: Feedthru**

Harrigan teaches a two conductor coaxial connector separated by an insulator, similar to an RCA connector. (Ex. 1012, ¶¶ 0043-45, FIGS 4A, 4B, 5A, 5B; Ex. 1028, FIG. 5; Ex. 1007, Parrott, ¶ 347.) A POSITA would recognize that the pin 530 and springs 500 would be separated by an insulator. (Ex. 1007, Parrott, ¶ 347.)

Harrigan's initiator 125 is an insulating material separating the electrical contacts on its opposite ends, including the contact for a signal in and a signal through to the next initiator. (*Id.* at 348.)

Therefore, Harrigan and its provisional teach the claimed insulator. (*Id.* at 349-50.)

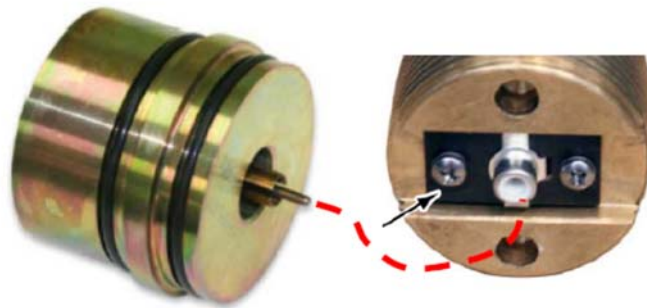
**e) Rogman teaches an insulator**

Rogman teaches RCA jacks that include two electrical contacts separated by an insulator on each end of the initiators 112, 312, 313 for a signal-in to the initiator and a signal through the initiator to a next initiator. (Ex. 1014, ¶31; Ex. 1020, pp. 1, 3-4, 7-8; Ex. 1007, Parrott, ¶ 351.) A POSITA would understand that the contacts of the RCA jacks of Rogman must necessarily be separated by an insulator, such as the body of the initiator, to function as intended. (Ex. 1007, Parrott, ¶ 352.)

Therefore, Rogman teaches the claimed insulator. (*Id.* at 353.)

**f) EWAPS teaches an insulator**

EWAPS teaches mating coaxial connectors, including insulators, in opposite ends of the insulating plastic loading tube, corresponding to signal-in and through wire contacts. (Ex. 1013, EWAPS; p. 010; Ex. 1007, Parrott, ¶¶ 354-55.)



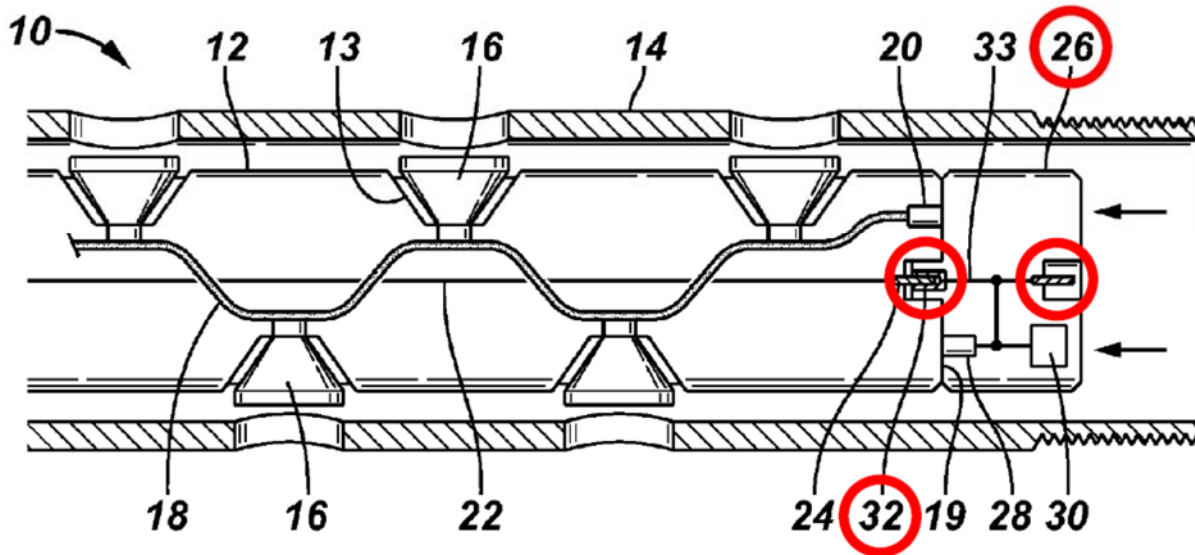
Disposable bulkheads

EWAPS teaches the insulator of Claims 1, 9, and 13. (Ex. 1007, Parrott, ¶ 356.)

**g) Black teaches an insulator**

Black teaches an arming device 26 with RCA jack electrical connectors with insulators on opposite ends. (Ex. 1002, ¶¶ 0024-26, 29, FIGS. 1-2, 7-10; Ex. 1007, Parrott, ¶ 357.)

**FIG. 2**



A POSITA would understand that the electrical contacts on the arming device 26 provide for a signal-in to the arming device 26 and a signal through the arming device to a next arming device, necessarily separated by an insulator either in the RCA connector or the body of arming device 26. (Ex. 1007, Parrott, ¶ 358-59.)

Therefore, Black teaches the claimed insulator. (*Id.* at 360.)

**h) Lanclos teaches insulator**

Lanclos teaches that there must be an insulator between the inlet lead 76 and supply lead 80 to function as described, otherwise all lines short to each other and become in effect the same single conductor. (Ex. 1015, 5:1-10; Ex. 1007, Parrott, ¶¶ 361-64.) Therefore, a POSITA would understand that an insulator must be positioned between the line-in and the line-out connectors of Lanclos to prevent the

lines from short-circuiting and failing to operate as intended. (Ex. 1007, Parrott, ¶ 365.)

Lanclos inherently teaches the claimed insulator. (*Id.* at 364-65.)

**i) Goodman teaches an insulator**

Goodman teaches a detonator/initiator 15, 45, 47 having electrical connectors for engaging with receptacle 18 including a signal-in and a through wire contact that must be separated by an insulator to function. (Ex. 1018, ¶¶ 0005-7, 0018-20, 0023-24, FIGS. 1-5; Ex. 1007, Parrott, ¶¶ 366-68.)

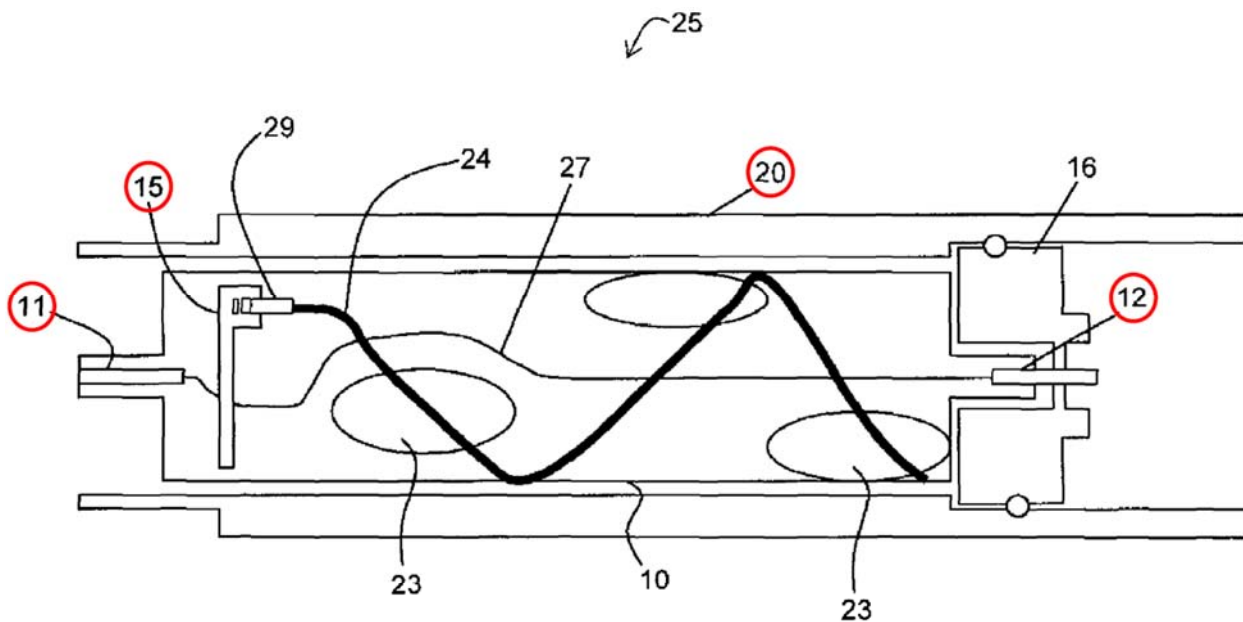


FIG. 2

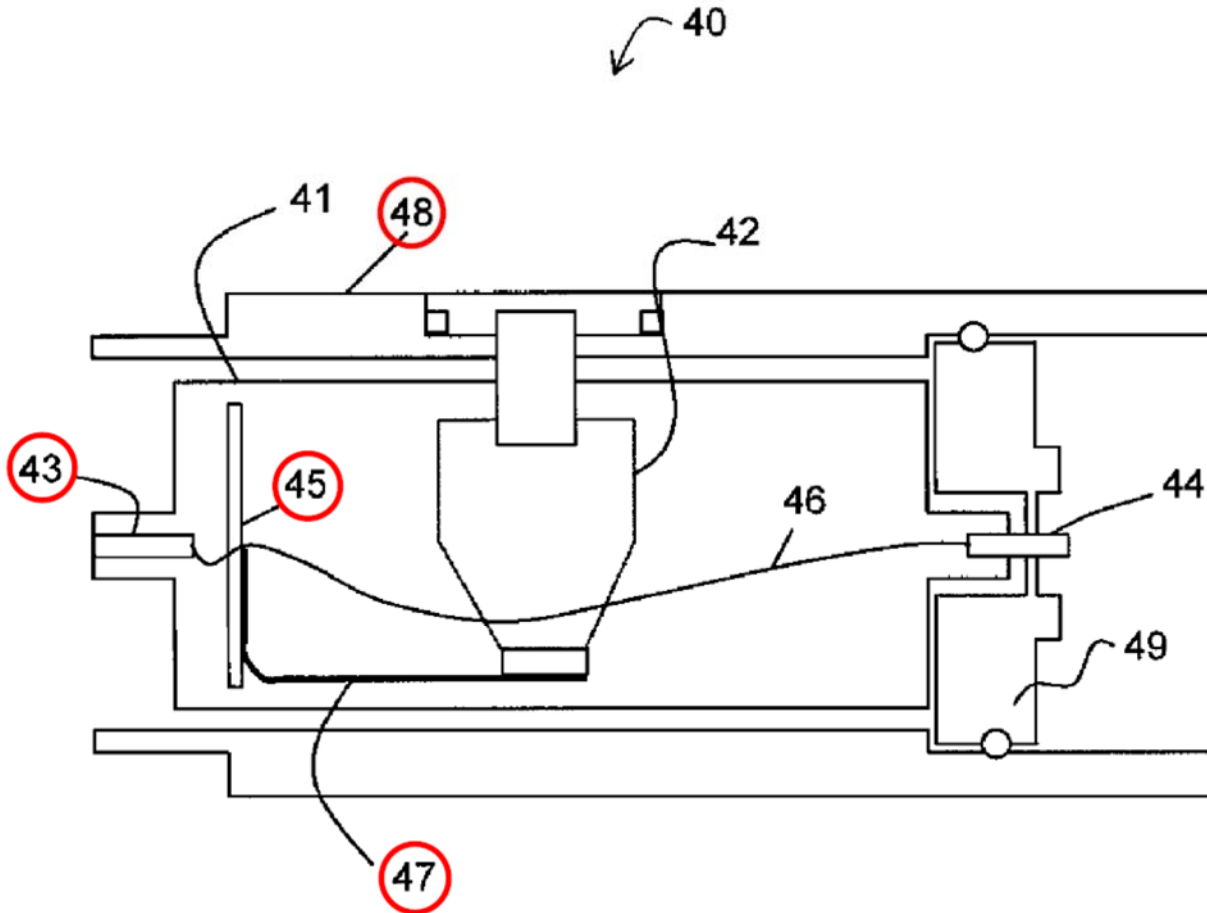


FIG. 4

Goodman inherently teaches the claimed insulator. (Ex. 1007, Parrott, ¶ 369.)

**j) Obviousness of an insulator**

It would be obvious to a POSITA, even without an explicit teaching in the prior art, to use insulators to prevent wires and electrical connections within a gun string from shorting to each other. (Ex. 1007, Parrott, ¶ 371.) A POSITA would



know that different electrical contacts and circuits must be separated by an insulator to act as separate contacts or circuits and that an insulator can support conductors in connectors. *Id.*

A POSITA would be motivated to combine Schacherer's electrical connectors and couplers or the switch assemblies of Lanclos with the electrical connectors and insulator teachings of Lerche '929, Harrigan, Rogman, Goodman, Black, EWAPS, and/or common knowledge to teach using an insulator between electrical contacts because the combination is required for Schacherer to function correctly, it is safer to electrically insulate wires such as using coaxial wires, twisted pairs, electrical wires in general in conjunction with insulated electrical connections or coaxial connectors, and it would be obvious to try and would yield predictable results. (Ex. 1007, Parrott, ¶¶ 372-73.) This would be the predictable application of known methods to the disclosure of Schacherer without any unexpected results, simple substitution of the known connectors and insulators for the perforating devices taught, the use of known connectors and insulators for their understood benefits, and obvious to try as selecting from the finite number of identifiable and predictable types of electrical connectors that are available with a reasonable expectation of success. (*Id.*)

#### **D. Bulkhead and Tandem Elements**

##### **1. Bulkhead**

Claim 1	Claim 9	Claim 16
a bulkhead,  wherein the bulkhead includes a contact pin in wireless electrical contact with the wireless signal-in connector,	the wireless signal-in connector  is configured for making wireless electrical contact with  an electrical contact of a bulkhead assembly	connecting a bulkhead into the outer gun carrier,  wherein the bulkhead includes a contact pin and  connecting the bulkhead into the outer gun carrier includes placing the contact pin in wireless electrical contact with the wireless signal in bulkhead connector

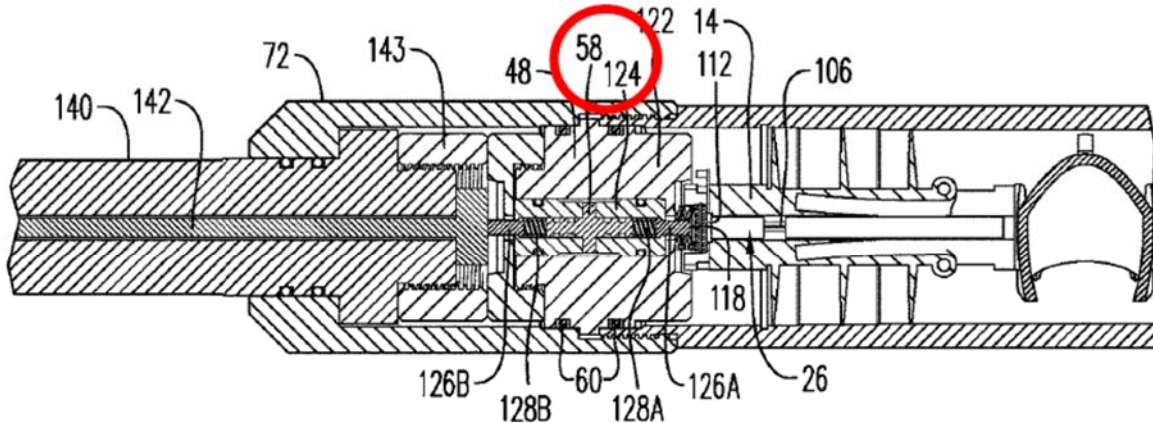
Claim 4
the contact pin transfers an electrical signal from a previous wellbore tool to the wireless signal-in connector.

**a) Indefiniteness, written description, and construction of bulkhead limitations**

As discussed above, the word “wireless” in the claims render them indefinite. (Ex. 1007, Parrott, ¶ 375.) Those same problems apply to the ambiguity introduced by the term “wireless electrical contact” which is never used, defined, or explained, in the Patent. *Id.* This ambiguity renders Claims 1, 9, and 16 indefinite. *Id.*

The Patent discusses a bulkhead assembly 58, and a pressure bulkhead or bulkhead 124, with a pin “connected to the through wire 106”, not a signal-in

connector. (Ex. 1001, 7:55-8:5, 8:28-39; Ex. 1007, Parrott, ¶ 376.) The figures of the Patent appear to point to a conductive core as bulkhead assembly 58, while referring to surrounding structure as pressure bulkhead 124. (Ex. 1001, FIGS. 19, 32, 33; Ex. 1007, Parrott, ¶ 377.)



**FIG. 33**

Given the description of a bulkhead referring to different components for different purposes, it is difficult for a POSITA to understand what is meant by the bulkhead limitations. (Ex. 1007, Parrott, ¶ 378.) At least some of the description indicates that the bulkhead *is* a contact pin, rather than including one. *Id.* Because a POSITA cannot tell, what, if anything, is meant by this limitation, it is indefinite. *Id.*

The Patent does not discuss “connecting” a bulkhead, or anything else, “into the outer gun carrier.” (*Id.* at 379.) The figures do not show anything called a bulkhead physically connected to an outer gun carrier. *Id.* Therefore, if this

limitation requires a bulkhead be physically connected to an outer gun carrier, the written description does not convey to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date of the patent and this claim is invalid. *Id.* The alternative, consistent with the specification, is that “connecting a bulkhead into the outer gun carrier” is meaningless. *Id.*

It is not clear what limitation, if any, is provided by the phrase “is configured for making wireless electrical contact with an electrical contact of a bulkhead assembly,” in Claim 9. (*Id.* at 380.) It is unclear whether this language requires the presence of “a bulkhead assembly,” or merely the ability to theoretically connect to any bulkhead assembly; and what, if anything, makes a connector “configured for” making electrical contact with a bulkhead assembly. *Id.* Without a specific type of electrical connection defined, then any electrical contact could be “configured for making electrical contact with an electrical contact of a bulkhead assembly” and this claim language is meaningless. *Id.* Because a POSITA cannot tell, what, if anything, is meant by this limitation, Claim 9 is indefinite. *Id.*

A POSITA cannot tell what a gun assembly is or whether Claim 9 requires that the detonator actually be inserted into a gun assembly to make electrical contact or only theoretical capability to make electrical contact. (*Id.* at 381.) The claim language appears to require that electrical contact is made *when* the detonator is

received, but it is unclear what that means. *Id.* Because a POSITA cannot tell, what, if anything, is meant by this limitation, Claim 9 is indefinite. *Id.*

The Patent never describes a detonator that makes electrical contact with a bulkhead or tandem “*when* it is received within a gun assembly.” (*Id.* at 382.) Instead, in every example of the Patent, a detonator is first inserted into a gun carrier, then a bulkhead and tandem are added. *Id.* Therefore, the Patent does not provide a written description of the claimed subject matter. *Id.*

A POSITA’s best guess as to the meaning of this limitation of Claims 1 and 9 is a bulkhead or contact pin in electrical contact with the “wireless signal-in connector” without the need to connect or attach wires directly to each other. (*Id.* at 384, 386.)

A POSITA’s best guess as to the meaning of this limitation of Claim 16 is putting a contact pin in electrical contact with the “wireless signal in connector” without the need to connect or attach wires directly to each other. (*Id.* at 385.)

**a) Indefiniteness and construction of transferring a signal**

As discussed above, the terms “wireless” and “wireless signal-in connector” render Claim 4 indefinite. (*Id.* at ¶ 683.)

It is not clear what is meant by a “previous wellbore tool” or whether it requires an order of assembly or direction of communication. (*Id.* at 684.) This ambiguity renders Claim 4 indefinite. *Id.*

The Patent neither describes nor teaches the contact pin transferring an electrical signal as claimed. (Ex. 1001, 7:63-66, 8:12-19, 8:31-33, FIGS. 19, 32, 33, 35B; Ex. 1007, Parrott, ¶¶ 685-86.) Therefore, the Patent does not provide a written description of the claimed subject matter. (Ex. 1007, Parrott, ¶ 687.)

A POSITA’s best guess as to the meaning of the limitations of Claim 4 is that the contact pin is electrically connected with another wellbore tool and a signal-in connector of the detonator. (*Id.* at 688.)

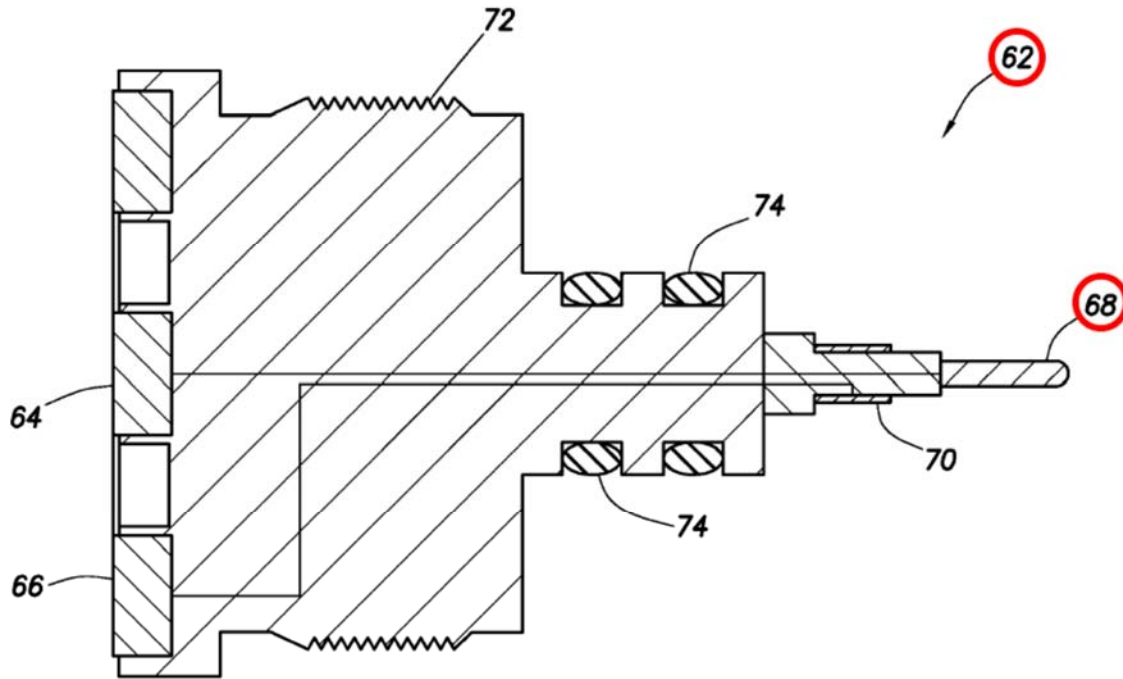
**b) Common knowledge includes a bulkhead transferring a signal**

A POSITA’s common knowledge includes the use of bulkheads with conductive pins to seal the inner components within the carrier from the outside environment and seal the gun assemblies from each other. (Ex. 1001, 7:57-63; Ex. 1007, Parrott, ¶¶ 387, 690.) As an example, SLB Catalog teaches sealed bulkheads between guns that are electrical feedthroughs. (Ex. 1005, pp. 287, 243, 424; Ex. 1007, Parrott, ¶¶ 430, 709.)

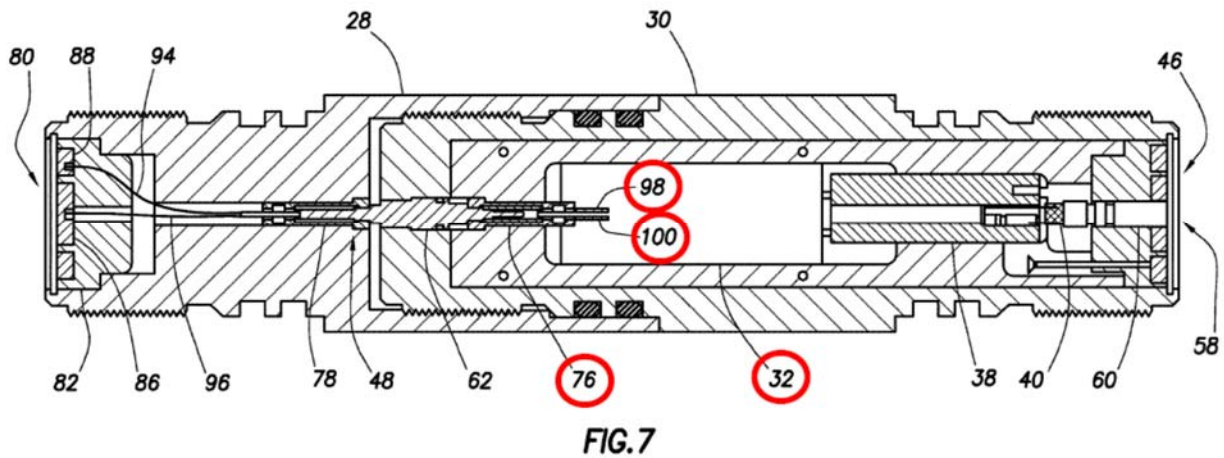
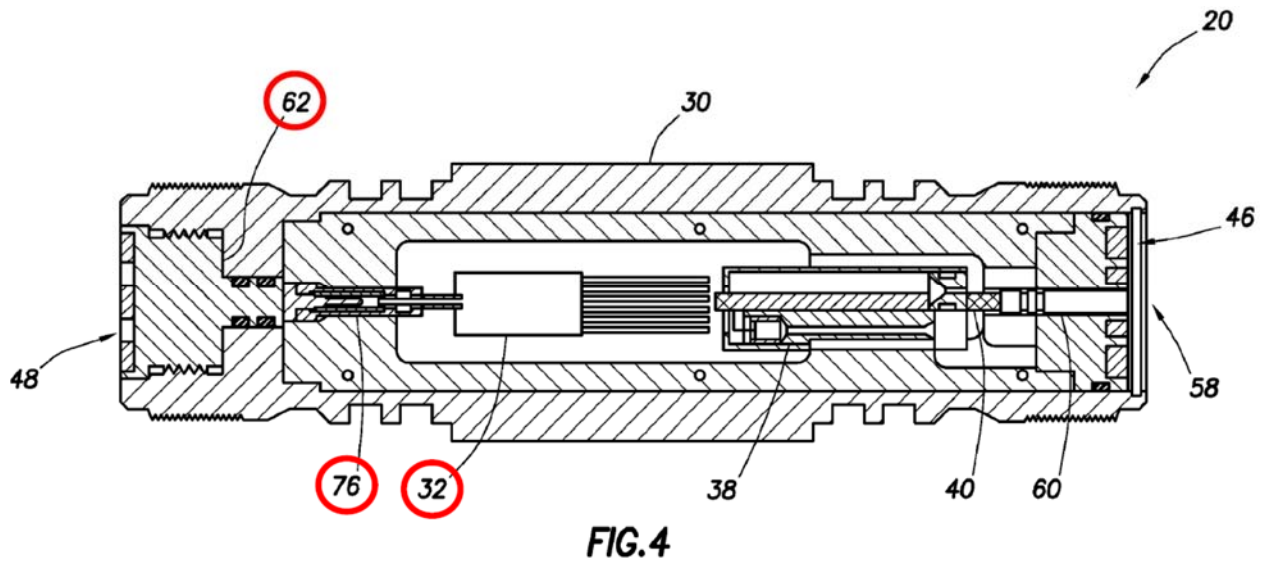
Therefore, a POSITA’s common knowledge teaches the bulkhead of Claims 1, 4, 9, and 16. (Ex. 1007, Parrott, ¶¶ 387, 690.)

**c) Schacherer teaches a bulkhead**

Schacherer teaches a number of variations on electrical coupler 62, each of which include electrical contact pin 68 passing electrical signals to a signal-in connector. (Ex. 1004, 5:10-21, 5:32-36 6:4-8, 6:13-22, FIGS. 3, 4, 5, 6, 7; Ex. 1007, Parrott, ¶¶ 390-392, 394.)



**FIG.3**



A POSITA would understand Schacherer's contact 68 to be a contact pin in electrical contact with a signal-in connector of a detonator without the need to connect or attach wires to each other. (Ex. 1004, 5:37-42; Ex. 1007, Parrott, ¶ 383.) As discussed elsewhere, a POSITA would understand connector 30 to be a part of the gun carrier and Schacherer's contact 68 is within connector 30. (Ex. 1007, Parrott, ¶ 393.)



Schacherer also teaches variations of coupler 62 that are longer, but still “mates with the connector 76, which is sealingly received in the connector 30. This provides additional assurance that pressure and fluid will not be transmitted through the connector 30 between explosive assemblies 20.” (Ex. 1004, 6:4-8, FIG. 6; Ex. 1007, Parrott, ¶ 395.)

Schacherer electrical connector 62 and associated electrical contacts teach a POSITA the use of bulkheads that include a conductive pin for transferring a signal from a previous wellbore tool to a next wellbore tool, including from one perforating gun to another, and placing those placing those bulkheads within and connected to gun carriers. (Ex. 1007, Parrott, ¶ 397.) Therefore, Schacherer teaches the bulkhead of Claims 1, 9, and 16. *Id.*

Schacherer teaches another bulkhead with electrical contact pin in electrical coupler 78 in Figures 5 and 7. (Ex. 1004, 4:5-10, 5:37-56, 6:9-12, FIGS. 5, 7; Ex. 1007, Parrott, ¶ 398.) A POSITA would understand Schacherer’s coupler 78 to include contact pin in electrical contact with a signal-in connector of a detonator without the need to connect or attach wires to each other. *Id.*

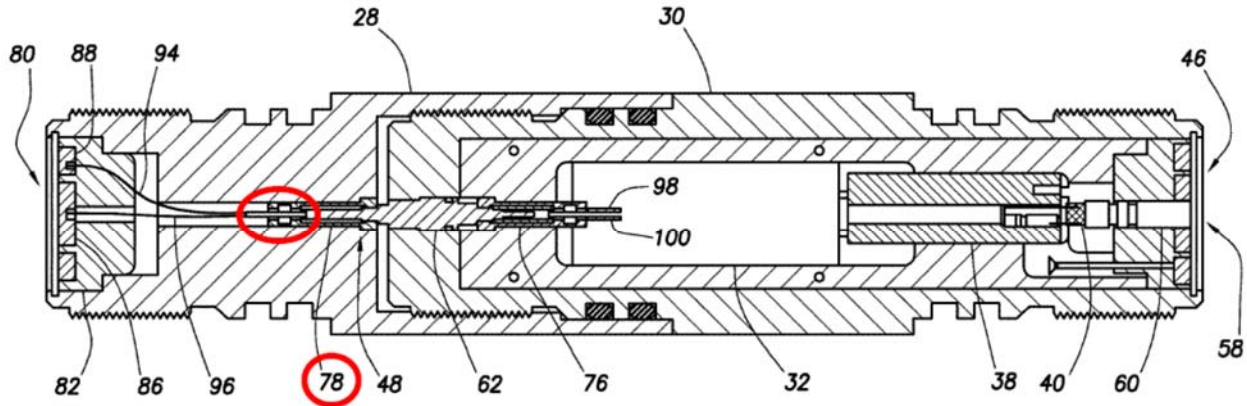


FIG. 7

Schacherer teaches rotary electrical couplers 62 and 78 “being sealed and thereby preventing fluid flow through the respective connector 30.” (Ex. 1004, 8:41-45; Ex. 1007, Parrott, ¶¶ 399-400.)

A POSITA would understand Schacherer’s electrical coupler 78 and associated electrical contacts teach the use of bulkheads that include conductive pins for transferring an electrical signal from one perforating gun to another, and placing those bulkheads within and connected to gun carriers. (Ex. 1007, Parrott, ¶¶ 400, 403.) Therefore, Schacherer teaches the bulkhead of Claims 1, 9, and 16. (*Id.* at 403.)

Schacherer teaches multiple bulkheads with electrical contact pins in FIG. 6 as circled below. (Ex. 1004, 4:5-10, 5:37-42, 6:9-12, FIGS. 5, 7; Ex. 1007, Parrott, ¶ 401.)

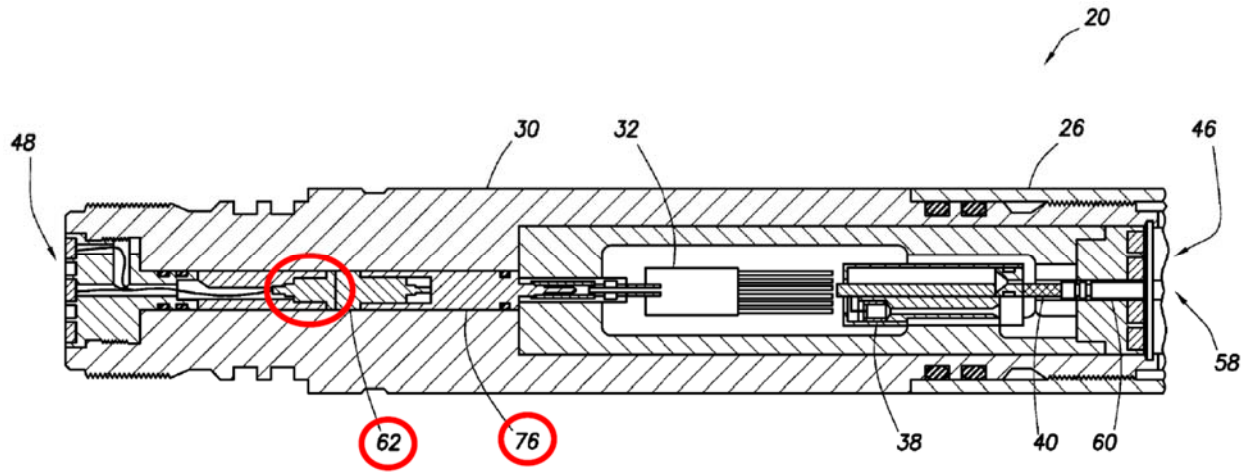


FIG. 6

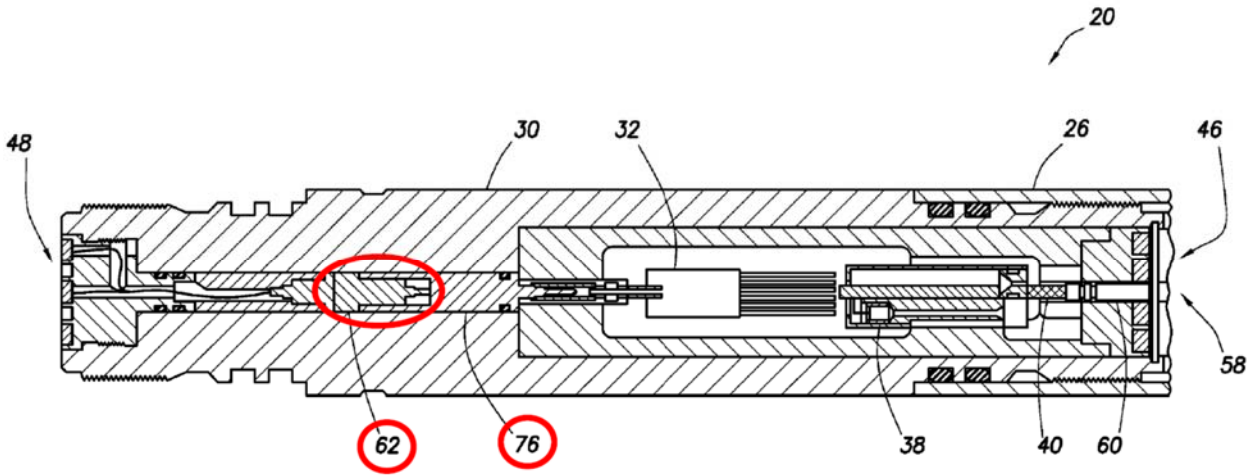


FIG. 6

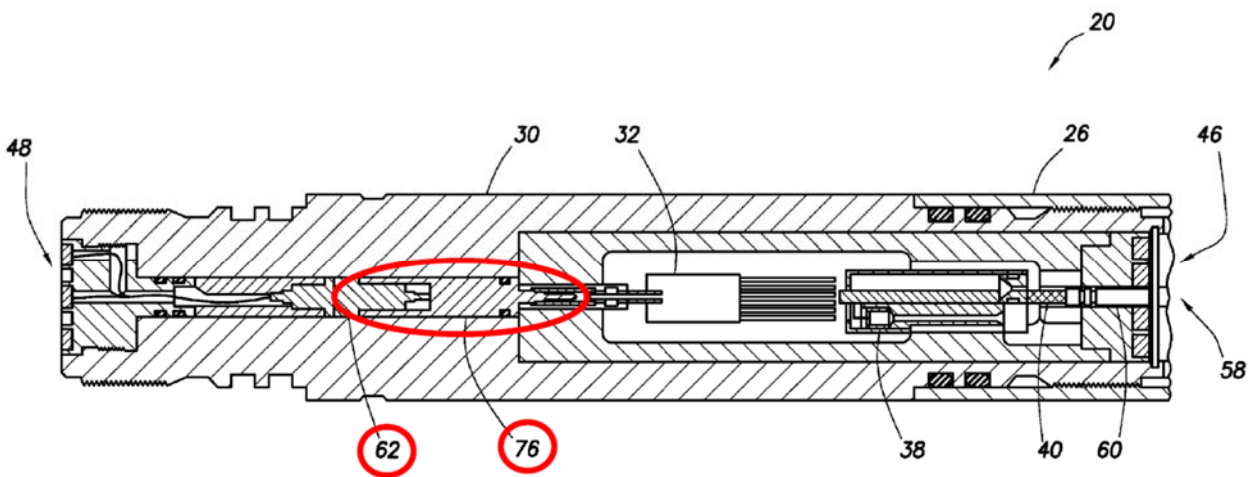


FIG. 6

A POSITA would understand the circled items above to include a contact pin in electrical contact with a signal-in connector of a detonator and a previous gun without the need to connect or attach wires to each other as claimed. (Ex. 1004, 5:37-56; Ex. 1007, Parrott, ¶¶ 40-103.)

Schacherer teaches that each of the contact pins discussed above (including 68, coupler 78, and those in FIG. 6) are electrically connected to both another perforating gun and a signal-in contact of the detonator as in Claim 4. (Ex. 1004, 2:33-34, 2:53-67, 4:14-39, 5:1-67, 6:1-22, FIGS 1-8; Ex. 1007, Parrott, ¶¶ 694-97.)

**d) Harrigan teaches a bulkhead**

Harrigan and its provisional teach that bulkheads 117 and 118 seal the ends of carrier 110 and loading tube 115 have a modular feedthrough for electrical communications. (Ex. 1012, Abstract, ¶¶ 0024, 032; Ex. 1028, pp. 1, 6, FIG. 5; Ex. 1007, Parrott, ¶¶ 407-09.) Harrigan teaches that feedthrough 119 includes an electrical connector pin 530 through it. (Ex. 1012, ¶¶ 0043-44, FIGS. 1A, 5A; Ex. 1028, pp. 1, 6, FIG. 5; Ex. 1007, Parrott, ¶ 409.)

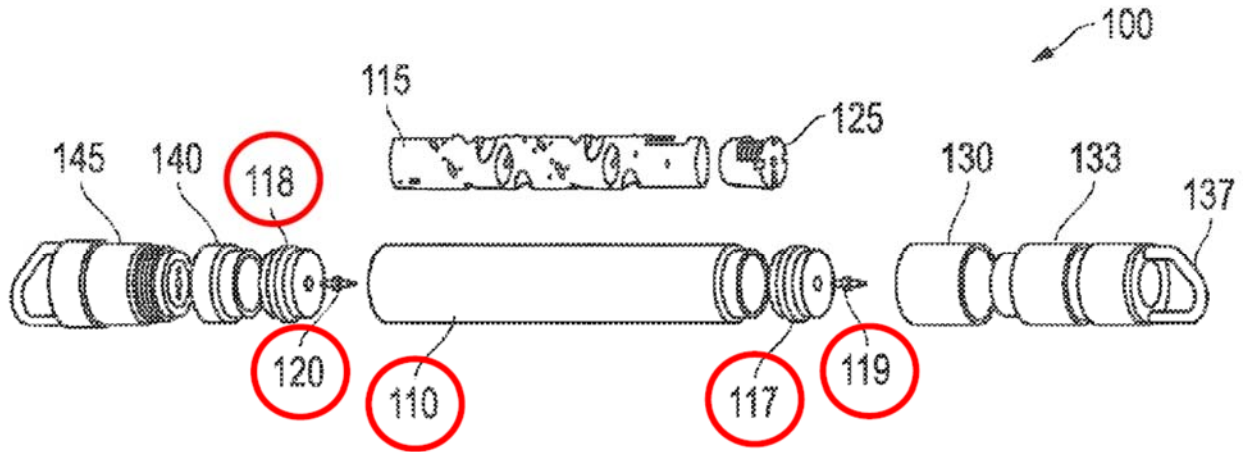


FIG. 1A

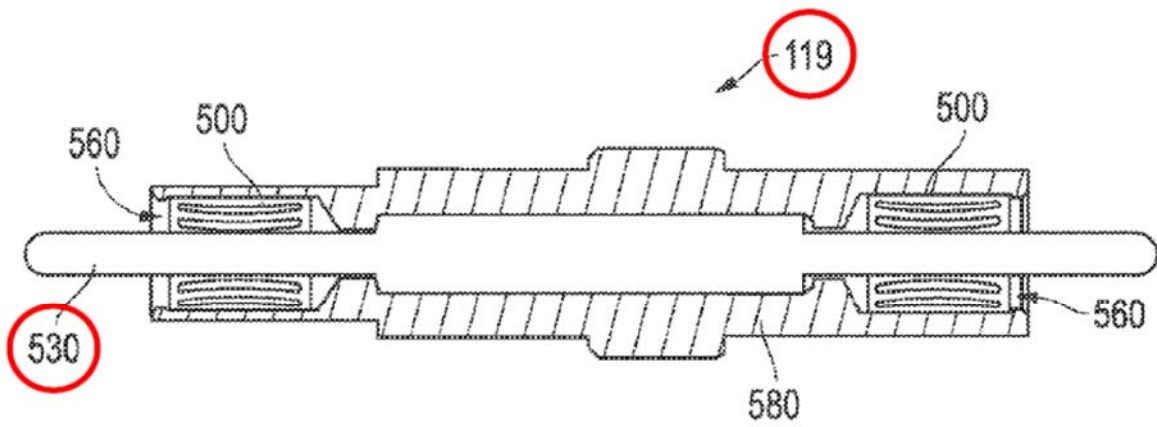
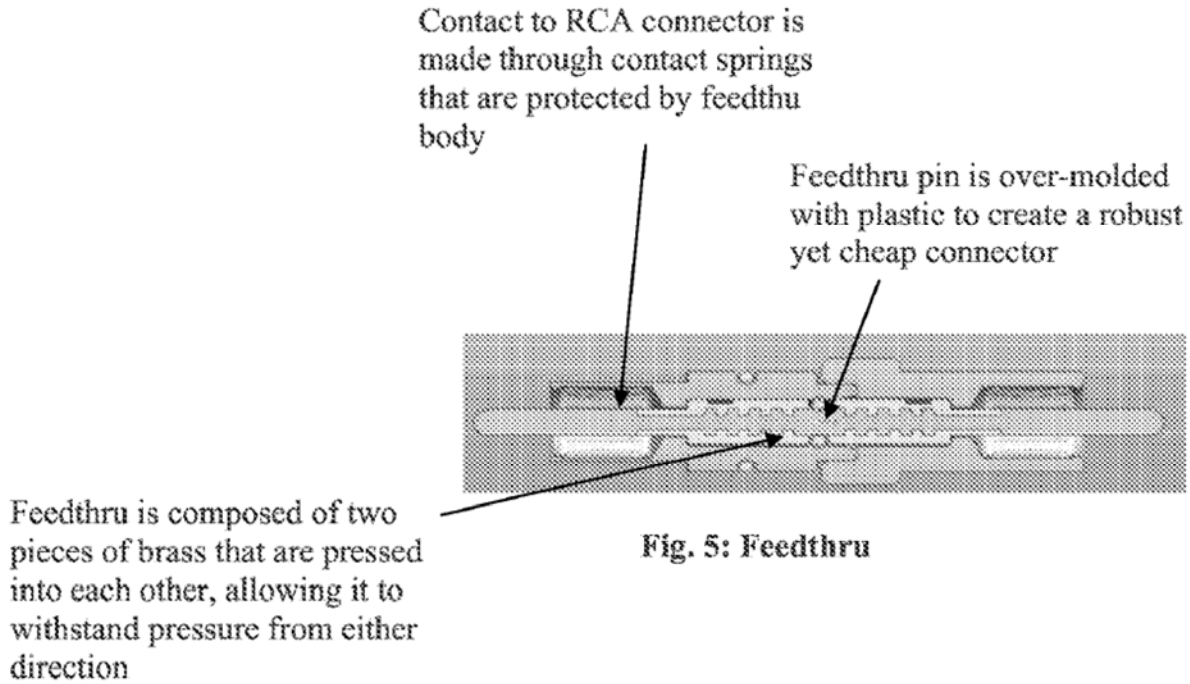


FIG. 5A



Harrigan teaches that communications between other perforating tools and the surface pass through the bulkhead and feedthrough contact pin 530 to the initiator's signal-in contact. (Ex. 1012 ¶¶ 0024, 0026, 0031-32, 0044, FIG. 2A; Ex. 1028, pp. 1, 3-6; Ex. 1007, Parrott, ¶ 703.) Therefore, Harrigan teaches the bulkhead and pin of Claims 1, 4, 9, and 16. (Ex. 1007, Parrott, ¶¶ 410-11, 699.)

**e) Rogman teaches a bulkhead**

Rogman teaches bulkheads 114, 116, 314, 316 isolating the interior of the perforating gun from wellbore fluids and including electrical conduits/seals 130, 330 designed to mate with the RCA jacks taught. (Ex. 1014, ¶¶ 0017-19, 0031, 0035, FIGS. 1, 3; Ex. 1020, pp. 1, 4, 7, 8; Ex. 1007, Parrott, ¶¶ 412-14.)

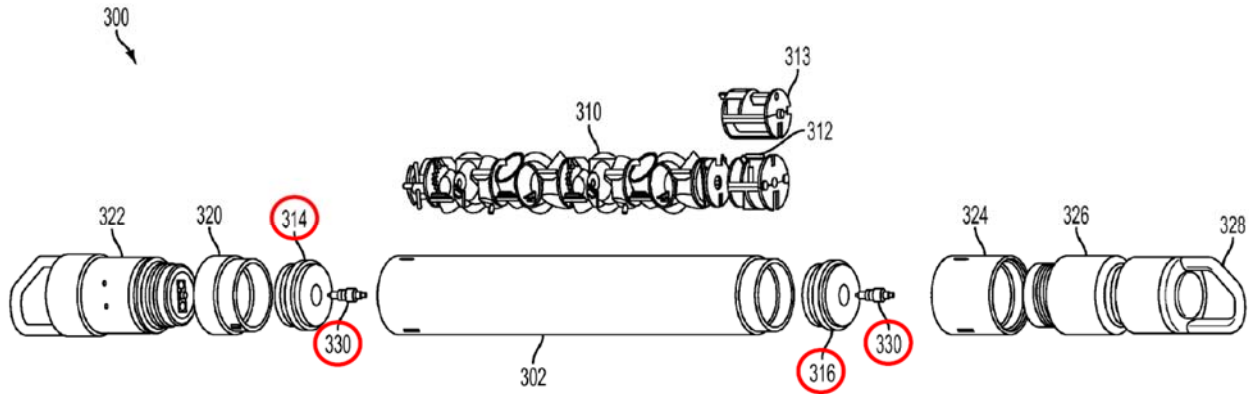


FIG. 3

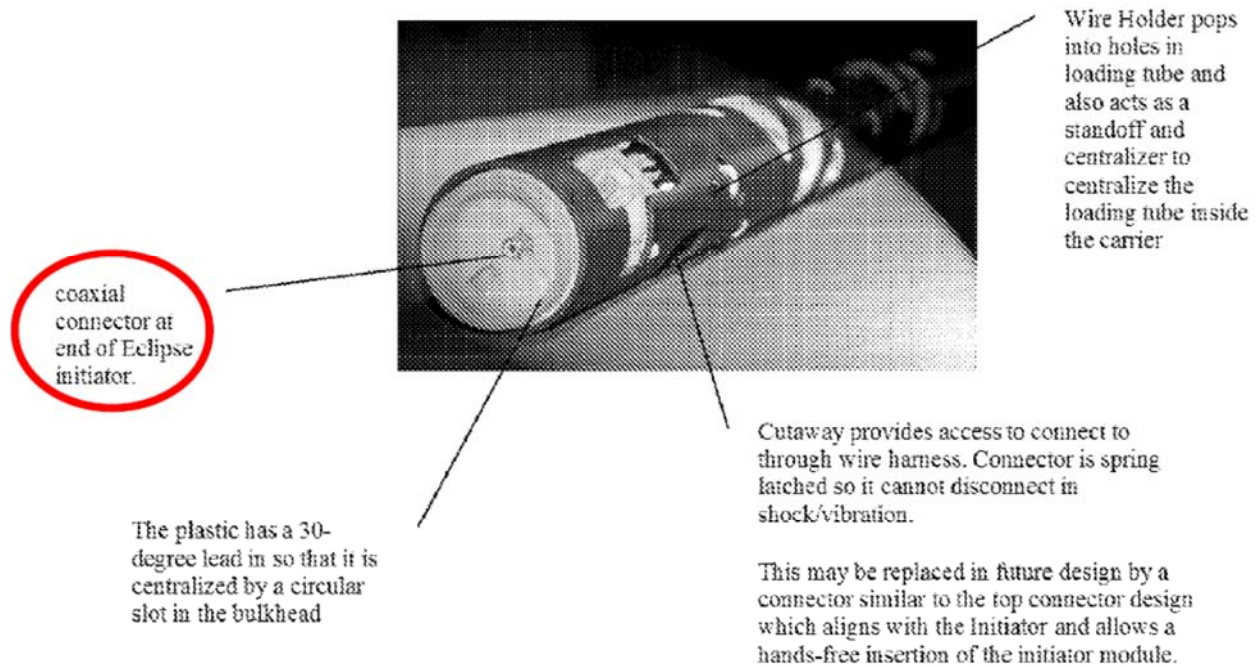


Fig. 5: End of loading tube

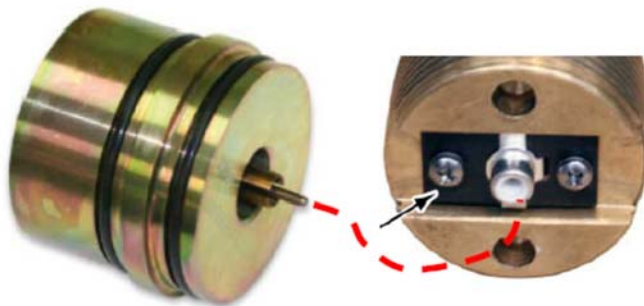
RCA jacks use pins and barrels to affect their connections. (Ex. 1007, Parrott, ¶ 414.) Rogman shows an electrical contact pin through the center of seals 130, 330, passing through bulkheads 114, 116, 314, and 316, consistent with RCA jacks. (Ex. 1014, FIGS. 1, 3; Ex. 1007, Parrott, ¶ 414.)

Rogman teaches coupling the signal in contact of one perforating gun and detonator to other perforating guns using feedthroughs to communicate between perforating guns. (Ex. 1014, ¶ 0028, FIG. 3; Ex. 1020, pp. 1, 6-8; Ex. 1007, Parrott, ¶ 700.)

Therefore, Rogman teaches the bulkhead and contact pin of Claims 1, 4, 9, and 16. (Ex. 1007, Parrott, ¶¶ 416-18, 700.)

**f) EWAPS teaches a bulkhead**

EWAPS teaches disposable bulkheads (to seal the perforating guns) with coaxial RCA connectors including pins to electrically connect another perforating gun or other tools to a signal-in contact of an initiator. (Ex. 1013, pp. 9, 10, 12; Ex. 1007, Parrott, ¶¶ 419, 701.) A POSITA would understand the signal-in to the initiator to be carried by the pin in the disposable bulkhead. (Ex. 1013, p. 010; Ex. 1007, Parrott, ¶ 419.)



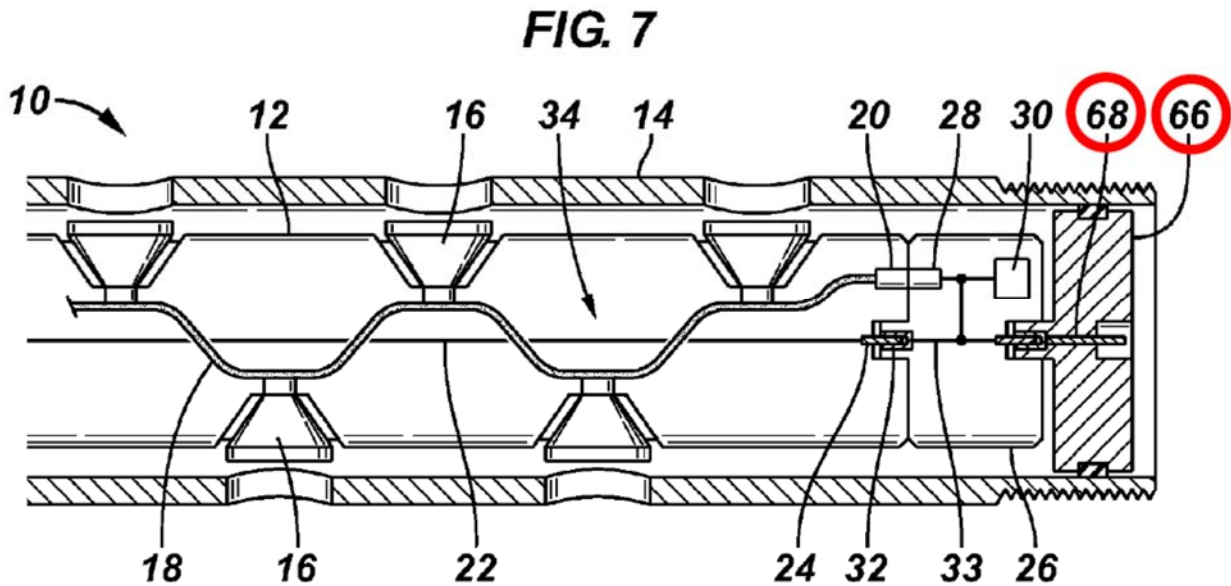
Disposable bulkheads

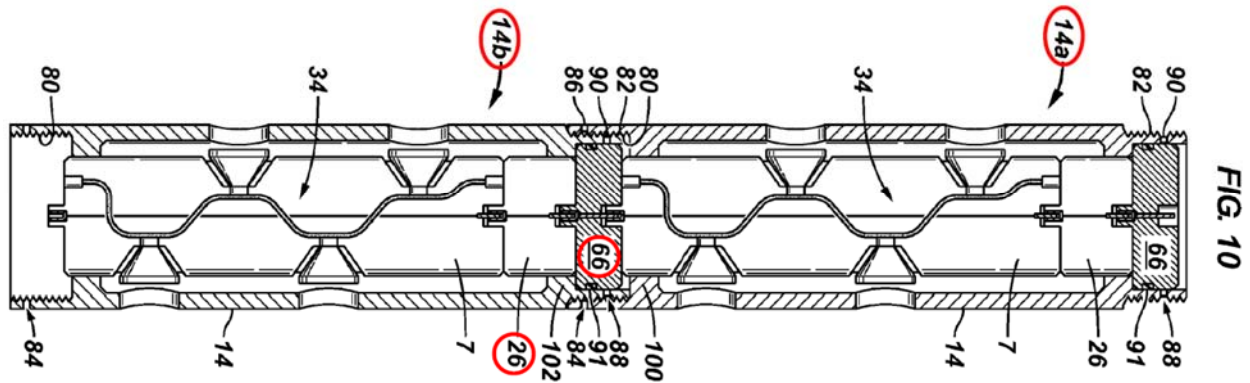


A POSITA would understand that the pin of EWAPS's bulkhead is a contact pin in electrical contact with the "wireless signal in connector" without the need to connect or attach wires directly to each other. (Ex. 1007, Parrott, ¶ 420.) Therefore, EWAPS teaches the bulkhead and pin of Claims 1, 4, 9, and 16. (Ex. 1007, Parrott, ¶¶ 420, 702.)

**g) Black teaches a bulkhead**

Black teaches electrically connecting multiple perforating guns together communicating through a pressure bulkhead 66 containing an electrical feed-through conductor 68 in electrical contact with a signal-in connector of arming device 26. (Ex. 1002, ¶¶ 0034, 0038-41, FIGS. 7, 10; Ex. 1007, Parrott, ¶ 421.)





Black teaches that the contact pin is electrically connected with another wellbore tool and a signal-in connector of the detonator. (Ex. 1002, ¶ 0034, FIGS. 7, 10; Ex. 1007, Parrott, ¶ 422.) Therefore, Black teaches the bulkhead and pins of Claims 1, 4, 9, and 16. (Ex. 1007, Parrott, ¶ 422.)

**h) Lanclos teaches a bulkhead**

Lanclos teaches a perforating gun string with perforating guns  $62_1$  through  $62_n$  connected electrically and mechanically, and sealed by connectors 116 and cartridge subs 68 with connectors 90 and receptacles 92. (Ex. 1015, 2:11-13, 7:1-30, FIGS. 2A-D, 3-5; Ex. 1007, Parrott, ¶¶ 423-24, 704.)

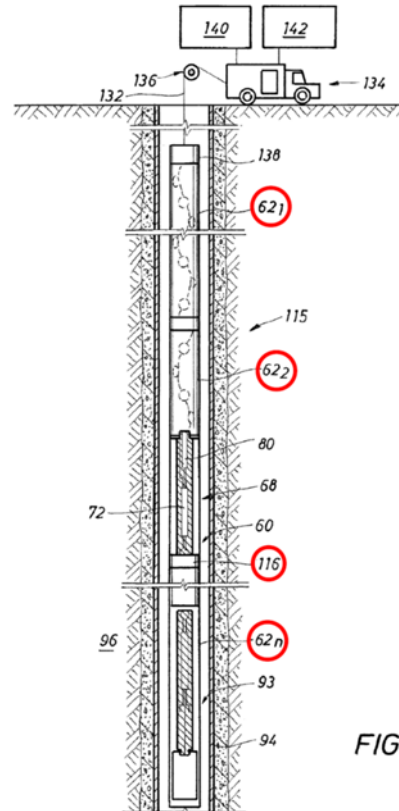


FIG. 5

A POSITA would understand that Lanclos teaches connector subs 116 with connectors 90 and receptacles 92 that include contact pins electrically connected with another wellbore tool and a signal-in connector of the detonator. (Ex. 1015, 5:41-47, 6:33-39, 6:48-50, FIGS. 3-5; Ex. 1007, Parrott, ¶¶ 425-26, 704.)

Therefore, Lanclos teaches the bulkhead and pin of Claims 1, 4, 9, and 16. (Ex. 1007, Parrott, ¶¶ 426, 705.)

**i) Goodman teaches a bulkhead**

Goodman teaches a pressure bulkhead 16, 49 with electrical contact pin engaging connectors 11 and 12 electrically connecting the guns in the string. (Ex. 1018. ¶¶ 0021-22, 0026, FIGS. 1-5; Ex. 1007, Parrott, ¶¶ 427, 706.)

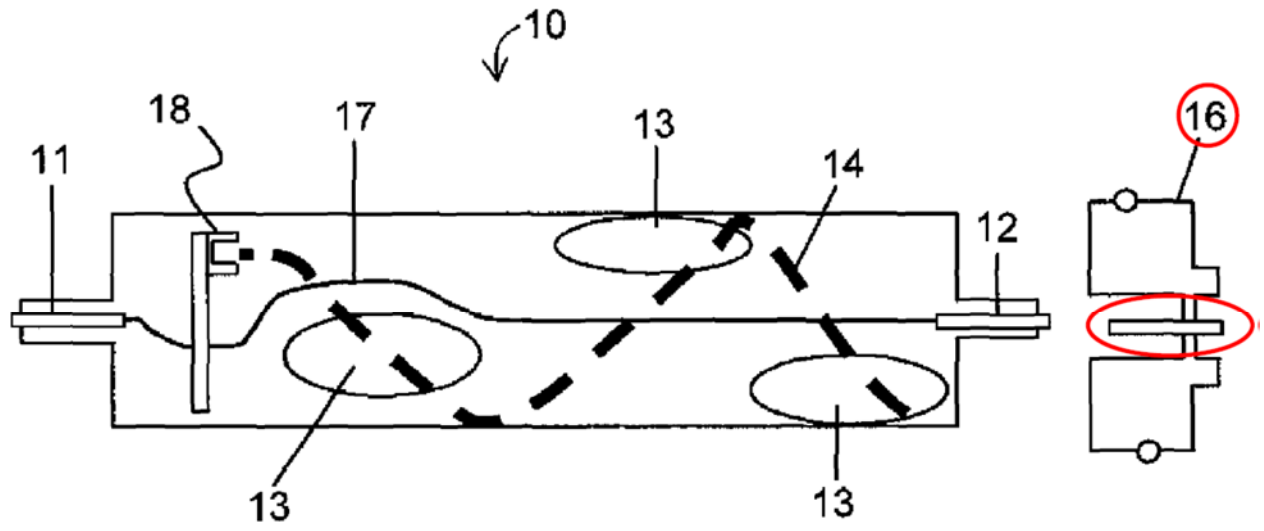


FIG. 1

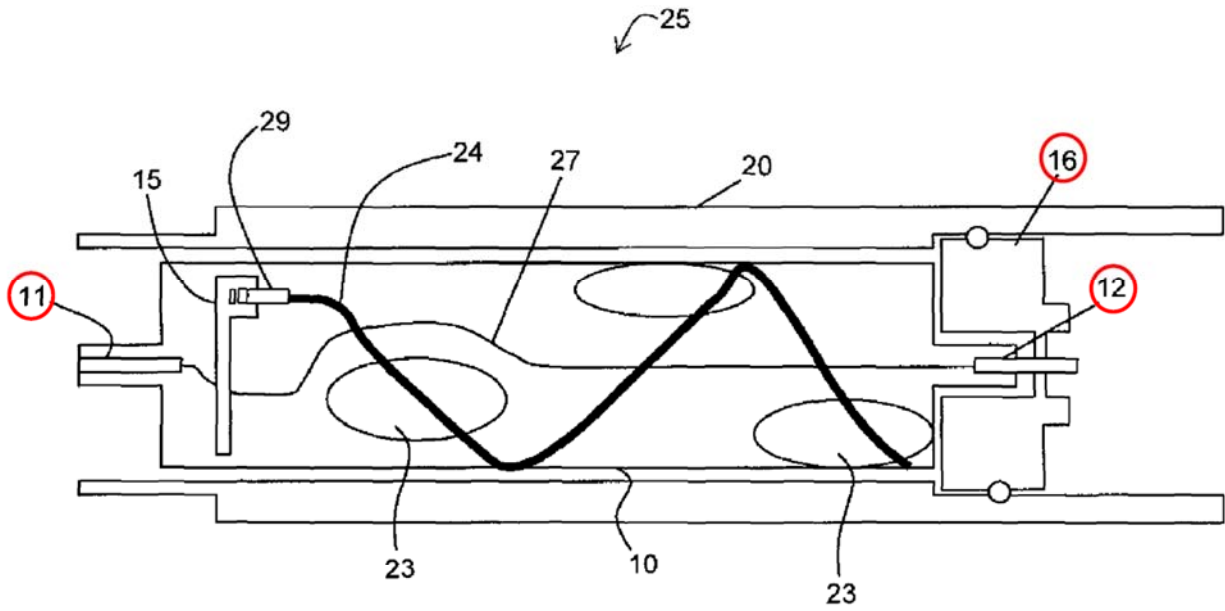


FIG. 2

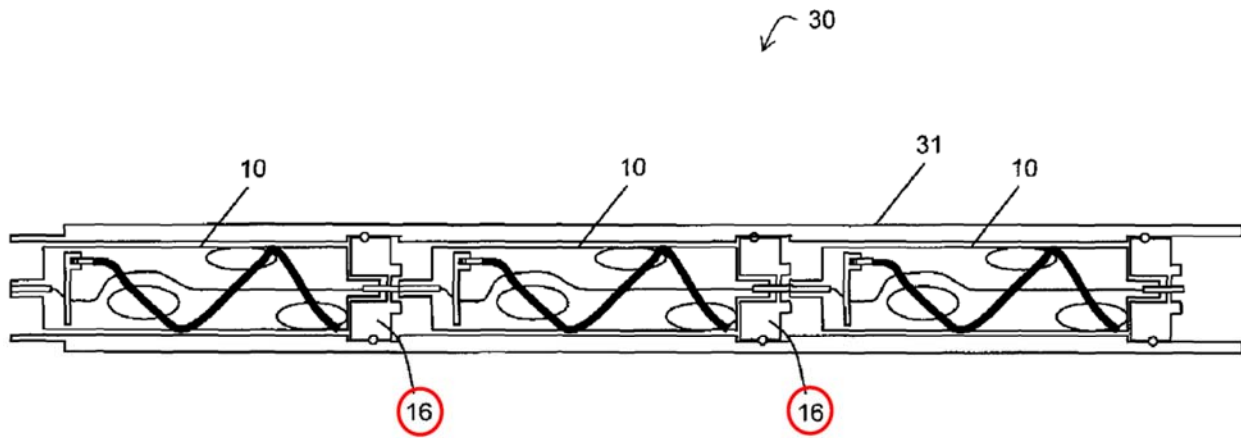


FIG. 3

Goodman teaches that pressure bulkhead 16, 49 seals the perforating guns. (Ex. 1018. ¶¶ 21-22, 26, FIGS. 2-5; Ex. 1007, Parrott, ¶ 428.)

A POSITA would understand Goodman's connector 12 and bulkhead 16 to include a contact pin in electrical contact with another wellbore tool and the signal-in contact of the detonator without the need to connect or attach wires directly to each other to render Goodman's perforating guns functional. (Ex. 1007, Parrott, ¶¶ 429, 707-08.) Therefore, Goodman teaches the bulkhead and pin of Claims 1, 4, 9, and 16. *Id.*

**j) Obviousness of a bulkhead**

If Lanclos or Goodman did not teach the claimed bulkhead, a POSITA would be motivated to combine Lanclos or Goodman with the bulkhead and tandem adapter teachings of Schacherer, Black, Rogman, Harrigan, and/or EWAPS because the electrical contacts through a tandem adapter/bulkhead less expensive to manufacture, it is easier to assemble, it prevents shock related disconnections, and it would be obvious to try and would yield predictable results. (Ex. 1007, ¶ 431.)

**2. Tandem**

Claim 1	Claim 9
<p>at least a portion of the bulkhead is contained within a tandem seal adapter, and</p>	<p>[a bulkhead assembly]                      contained at least in part within a tandem seal adapter                       when the modular detonator is received within a gun assembly of a perforating gun system, and</p>
<p>the wireless ground contact connector is in wireless electrical contact with the tandem seal adapter.</p>	<p>the wireless ground contact connector is configured for making wireless electrical contact with the tandem seal adapter                       when the modular detonator is received within the gun assembly of the perforating gun system.</p>

**a) Indefiniteness, lack of written description, and construction of tandem limitations**

As discussed above, “wireless” and “wireless electrical contact” renders the claims indefinite. (Ex. 1007, Parrott, ¶ 433.)

A POSITA’s best guess for the meaning of this limitation of Claim 1 would be an adapter or connector, providing at least part of a fluid seal between two components or from the outside environment and at least partially containing the

bulkhead, in electrical contact with the “wireless ground contact connector” without the need to connect or attach wires directly to each other. (Ex. 1007, Parrott, ¶ 436.)

It is unclear whether the wireless ground contact connector is configured for making wireless electrical contact with the tandem seal adapter, in Claim 9 requires the presence of a tandem or merely the ability to theoretically connect to any tandem. (*Id.* at 437.) It is unclear what, if anything, makes a connector “configured for” making electrical contact with a tandem. *Id.* If any electrical contact could be configured for making electrical contact with the tandem, this claim language is meaningless. *Id.* Because a POSITA cannot tell, what, if anything, is meant by this limitation, Claim 9 is indefinite. *Id.*

As discussed above, “when the modular detonator is received within the gun assembly of the perforating gun system” renders Claim 9 indefinite. (*Id.* at 438.)

As discussed above, the Patent never describes a detonator that makes electrical contact with a bulkhead or tandem “*when* it is received within a gun assembly,” failing to provide a written description of the claims. (*Id.* at 439.)

A POSITA’s best guess as to the meaning of this limitation of Claim 9 is that it requires an adapter or connector, providing at least part of a fluid seal between two components or from the outside environment and at least partially containing the bulkhead, in electrical contact with the “wireless ground contact connector” without the need to connect or attach wires directly to each other. (*Id.* at 440.)



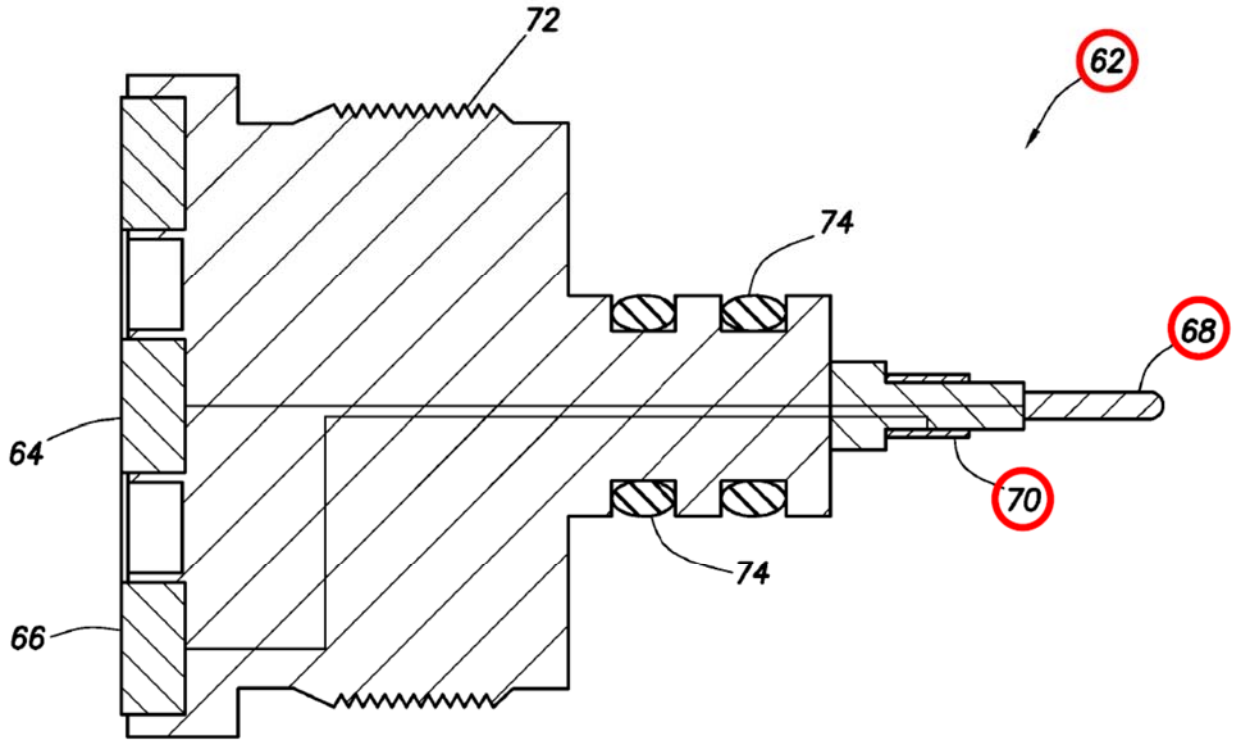
**b) Common knowledge includes tandems**

A POSITA's common knowledge includes the use of bulkheads, tandems, and related components to seal components within the carrier from the outside environment and seal gun assemblies from each other. (Ex. 1001, 7:57-63; Ex. 1007, Parrott, ¶ 441.) Common knowledge would include passing electrical signals through electrical connectors passing through bulkheads, including coaxial pin and barrel connectors such as RCA connectors. (Ex. 1007, Parrott, ¶ 441.) Common knowledge includes a ground or return path signal through metallic outer bodies of tool strings. *Id.* As an example, SLB Catalog teaches sealed bulkheads between guns that are electrical feedthroughs. (Ex. 1005, p. 287, 243, 424; Ex. 1007, Parrott, ¶¶ 430, 709.)

Therefore, a POSITA's common knowledge teaches the claimed tandem. (Ex. 1007, Parrott, ¶¶ 441-42.)

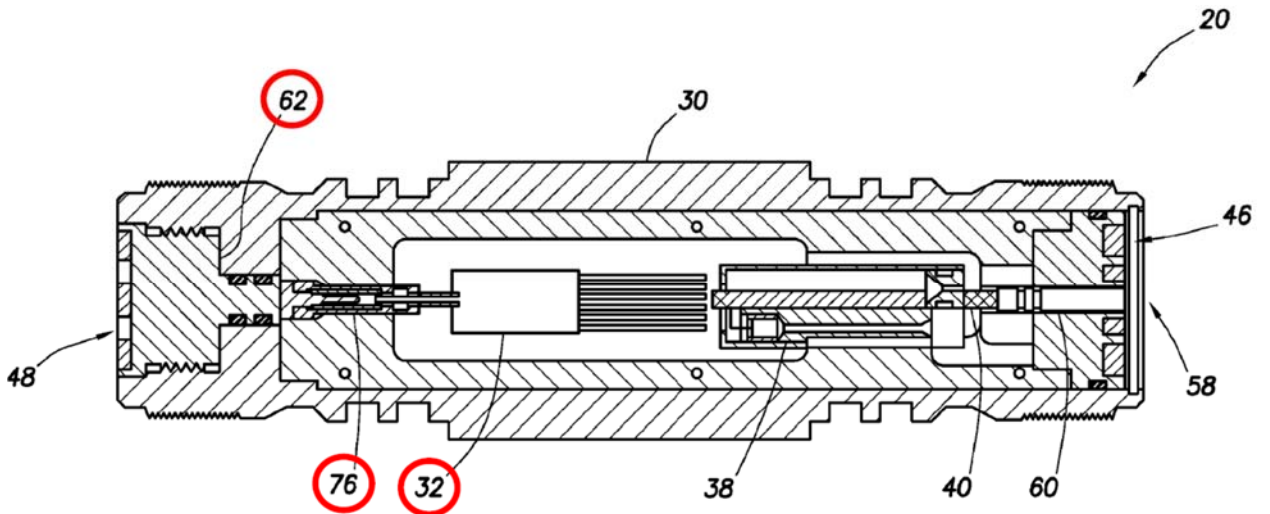
**c) Schacherer teaches a tandem**

The body of coupler 62 in provides a fluid seal within coupler 30 with seals 74 and includes a ground contact 70 connected to a ground contact for selective firing module 32. (Ex. 1004, 5:23-36, 6:4-8 6:13-22, FIGS. 3, 4, 5, 6; Ex. 1007, Parrott, ¶¶ 443-49.)



**FIG. 3**

POSITA would understand each variation of coupler 62 taught by Schacherer to include a body, seals, contact pin 68, and contact 70. (Ex. 1007, Parrott, ¶¶ 443, 444.)



**FIG. 4**

Schacherer also teaches that each of housings 28, 30 and 26 can serve as tandem seals in contact with the ground contact of the detonator and provide a fluid seal. (Ex. 1004, 5:22-24, 6:1-8, 6:18-22, 8:41-45, FIGS. 2, 4, 5-7; Ex. 1007, Parrott, ¶ 453.)

Schacherer teaches connector 28 containing a contact pin in coupler 78 in electrical contact with a signal-in connector of a detonator. (Ex. 1004, 4:5-10, 5:37-56, 6:9-22, FIGS. 5, 7; Ex. 1007, Parrott, ¶ 455.) Schacherer's connector 28 houses a ground contact to connect with electrical connection 80. (Ex. 1004, 5:37-56; Ex. 1007, Parrott, ¶ 455.)

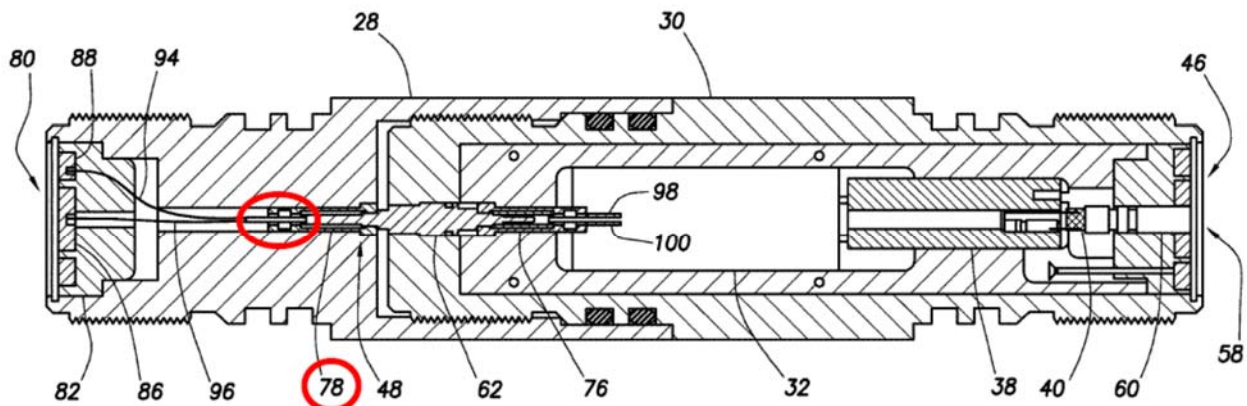


FIG. 7

Schacherer teaches multiple tandems with electrical contact pins in FIG. 6 as circled below. (Ex. 1004, 4:5-10, 5:37-42, 6:9-12, FIGS. 5, 7; Ex. 1007, Parrott, ¶ 458.)

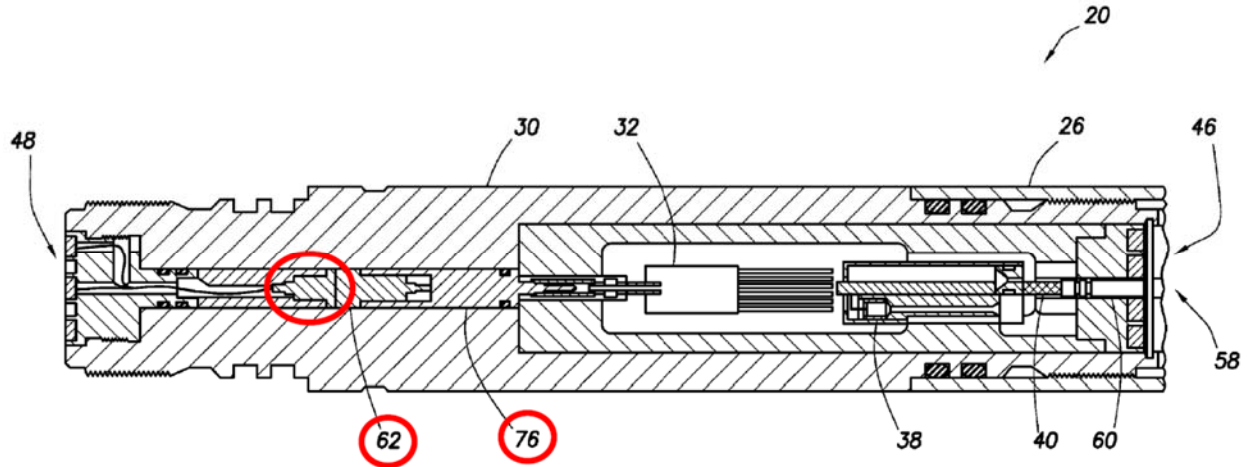


FIG. 6

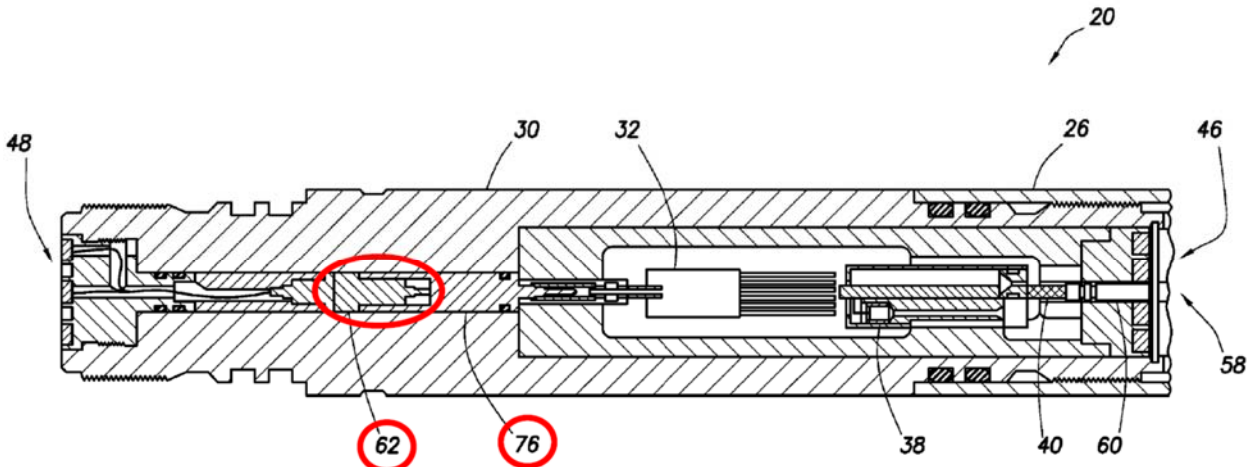


FIG. 6

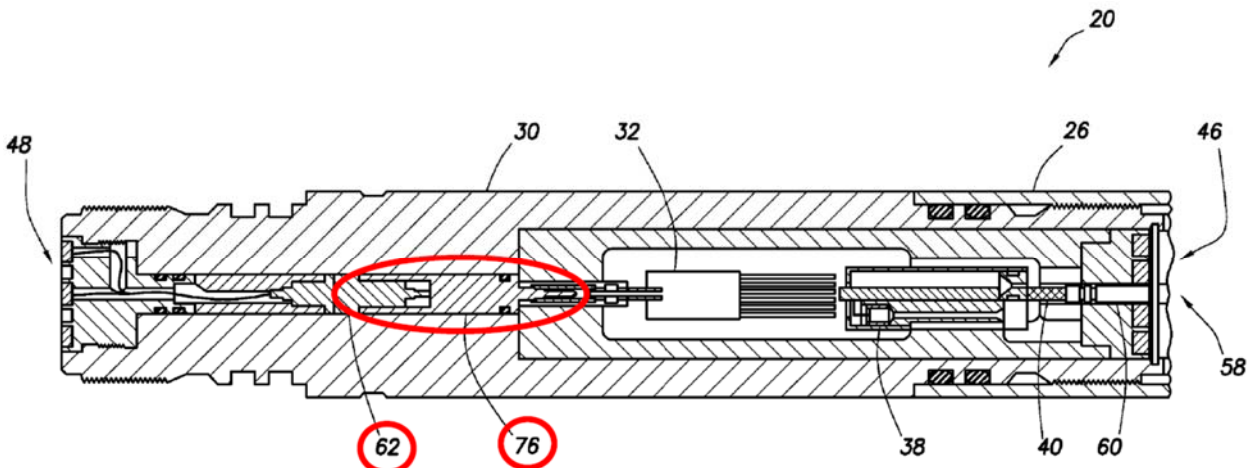


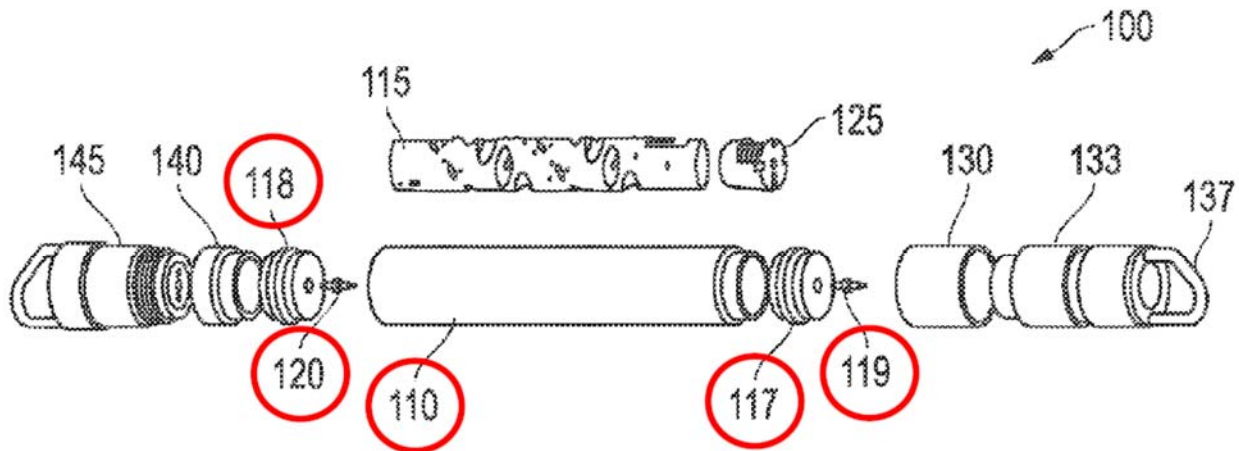
FIG. 6

The circled items above include a ground contact in electrical contact with a ground contact connector of a detonator without the need to connect or attach wires to each other and provide a fluid seal. (Ex. 1004, 5:22-24, 5:37-56, 6:1-8, 8:41-45, FIGS. 2, 4, 5-7; Ex. 1007, Parrott, ¶ 459.)

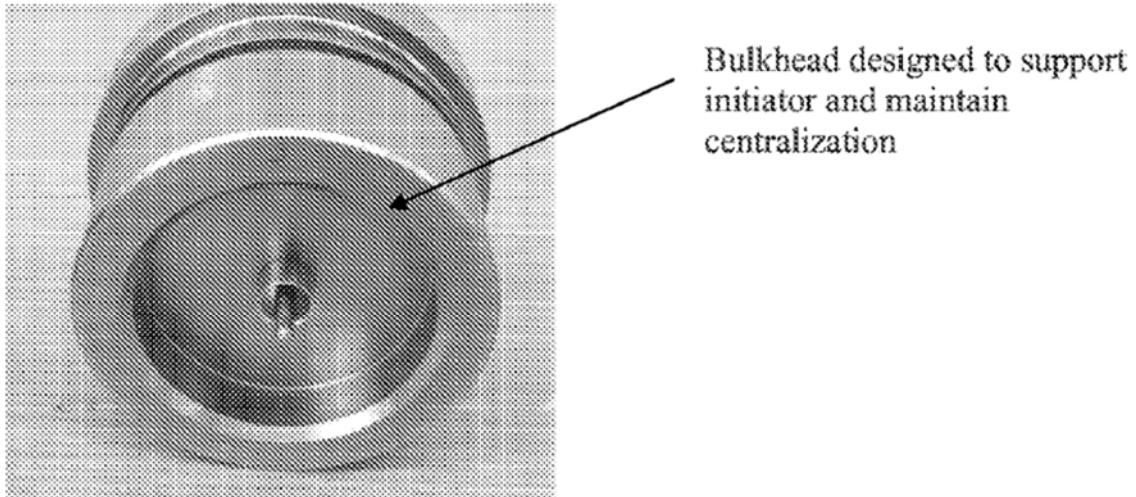
Therefore, the body of coupler 62, housings 28, 30, and 26, connector 28, and the circled sections of FIG. 6 teach the tandem of Claims 1 and 9. (Ex. 1007, Parrott, ¶¶ 449-59, 461-62, 459-60.)

**d) Harrigan teaches a tandem**

Harrigan and its Provisional teach bulkheads 117, 118 with electrical feedthroughs 119, 120 that provide a fluid seal. (Ex. 1012, ¶¶ 0024, 0031-32, 0035-36, FIGS. 1A, 2A, 5A; Ex. 1028, pp. 5, 6, FIGS. 1, 5; Ex. 1007, Parrott, ¶ 461.)



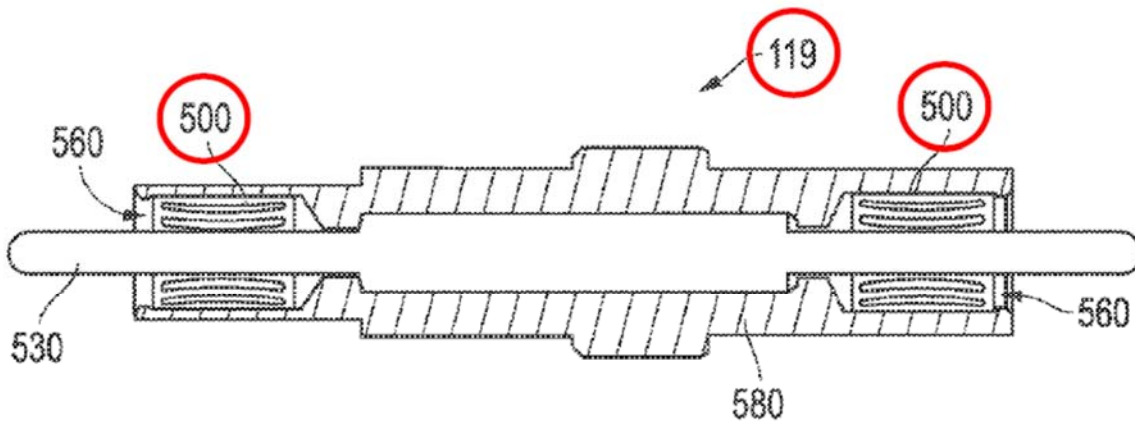
*FIG. 1A*



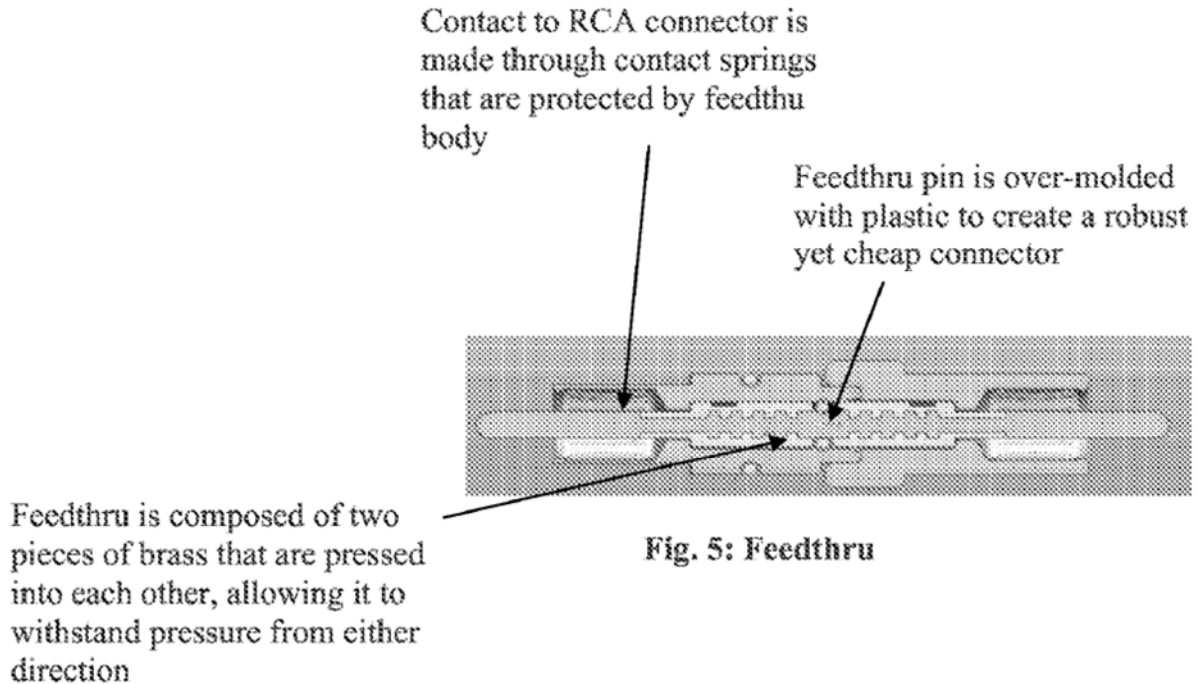
Bulkhead designed to support initiator and maintain centralization

**Fig. 5: Bulkhead End**

Harrigan teaches a two conductor coaxial connector, with ground contact through barrel insert 500 within bulkhead 117. (Ex. 1012, ¶¶ 0043-45, FIGS 4A, 4B, 5A, 5B; Ex. 1028, pp. 5, 6, FIGS. 1, 5; Ex. 1007, Parrott, ¶ 463.)



*FIG. 5A*



Therefore, Harrigan teaches the claimed tandem. (Ex. 1007, Parrott, ¶ 464.)

**e) Rogman teaches a tandem**

Rogman teaches bulkheads 114, 116, 314, 316 providing a fluid seal and electrical connectors, including a ground contact connected to a ground contact of the initiator. (Ex. 1014, ¶¶ 0017-19, 0035, FIGS. 1, 3; Ex. 1020, pp. 1, 4, 7, 8; Ex. 1007, Parrott, ¶¶ 465-70.)

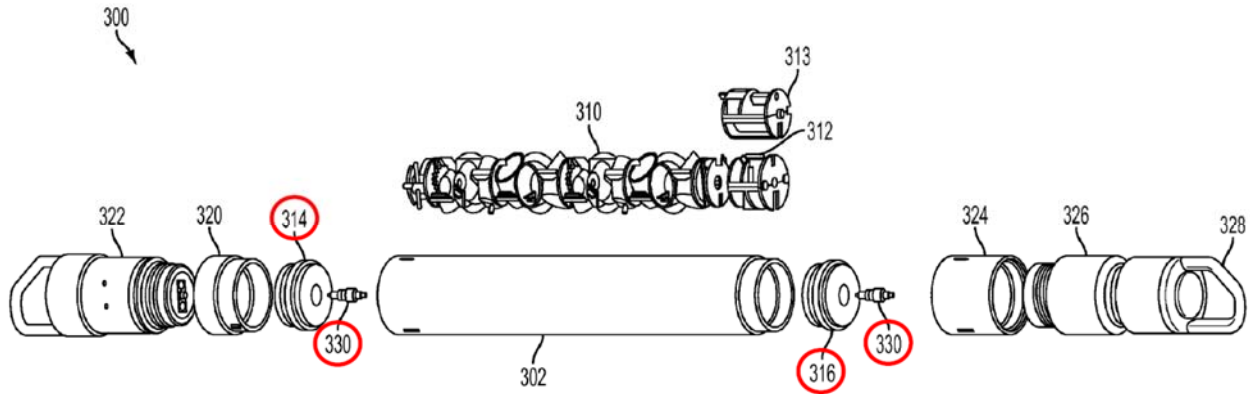
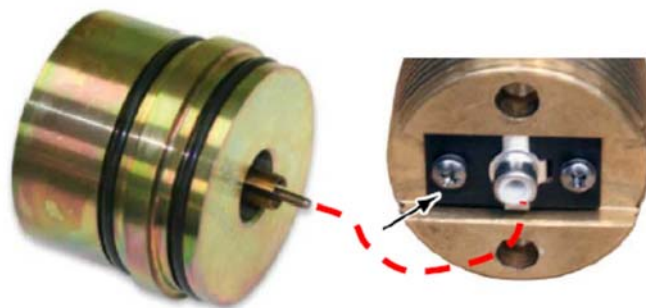


FIG. 3

Therefore, Rogman teaches the claimed tandem. (Ex. 1007, Parrott, ¶ 471.)

**f) EWAPS teaches a tandem**

EWAPS teaches disposable bulkheads sealing the guns that have a coaxial RCA type connector whose barrel is connected to the ground contact on the initiator. (Ex. 1013, pp. 9, 10, 12; Ex. 1007, Parrott, ¶¶ 472-73.)



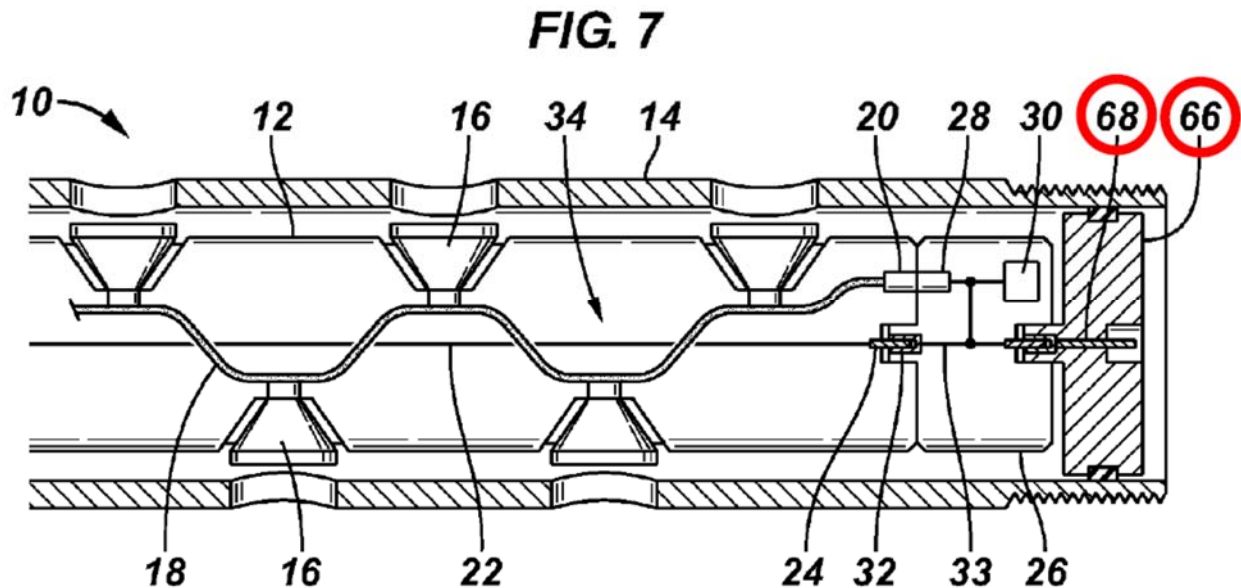
Disposable bulkheads



Therefore, EWAPS bulkhead teaches the tandem of Claims 1 and 9. (Ex. 1007, Parrott, ¶ 473.)

**g) Black teaches a tandem**

Black teaches a fluid sealing bulkhead 66 containing an electrical feed-through conductor 68 of an RCA Connector in electrical contact with a ground contact of arming device 26. (Ex. 1002, ¶¶ 29, 34, 37-40, FIGS. 7, 10; Ex. 1007, Parrott, ¶¶ 474-76.)

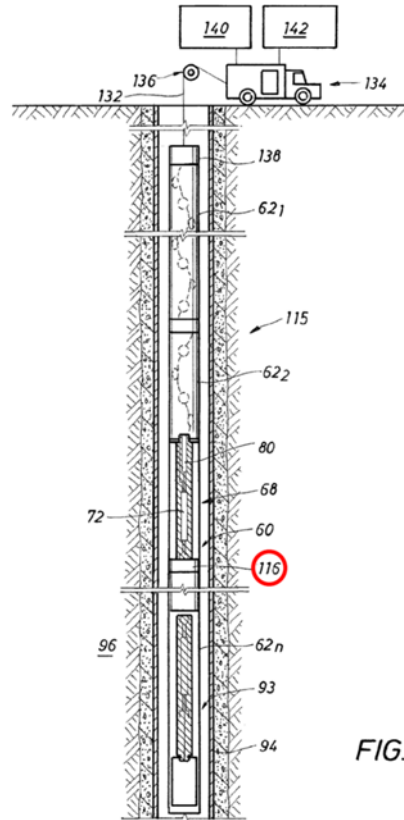


A POSITA would understand that Black teaches that bulkhead 66 is in electrical contact with the ground barrel contact of arming device 26. (Ex. 1007, Parrott, ¶ 477.)

Therefore, Black teaches the claimed bulkhead. (*Id.* at 478.)

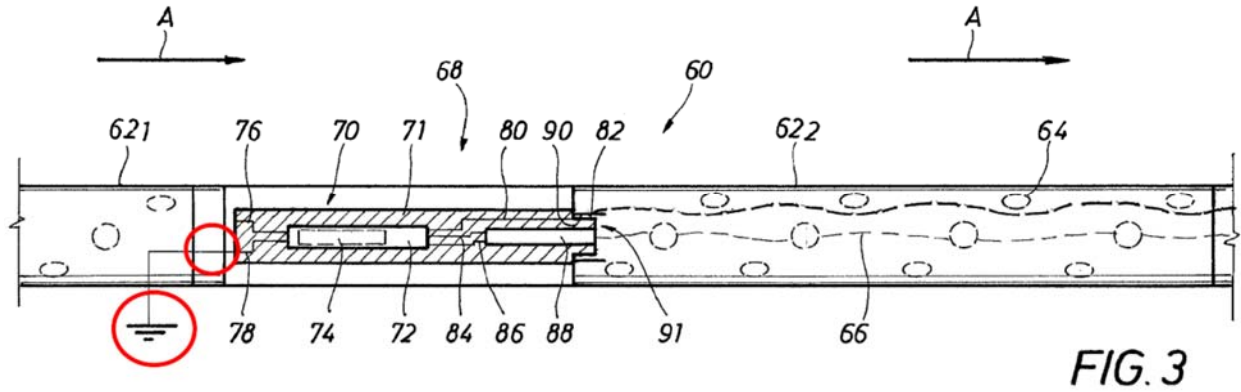
**h) Lanclos teaches a tandem**

Lanclos teaches connector subs 116 having electrical connectors coupling cartridge subs 68 with perforating guns mechanically and electrically. (Ex. 1015, 7:17-30, FIGS. 3-5; Ex. 1007, Parrott, ¶¶ 479-80.)



Lanclos teaches sealing connector subs. (Ex. 1015, 2:11-13, FIGS. 2A-D; Ex. 1007, Parrott, ¶ 480.)

Lanclos teaches that the connector sub 116 is in electrical contact with the ground contact connector of the detonator. (Ex. 1015, Lanclos, 6:48-50, FIGS. 3-4; Ex. 1007, Parrott, ¶ 481.)



Therefore, Lanclos teaches the claimed tandem. (Ex. 1007, Parrott, ¶ 482.)

**i) Goodman teaches a tandem**

Goodman teaches a pressure bulkhead 16, 49 with electrical contact pin engaging connectors 11 and 12 for electrical communication. (Ex. 1018. ¶¶ 0021-22, 0026, FIGS. 1-5; Ex. 1007, Parrott, ¶ 483.)

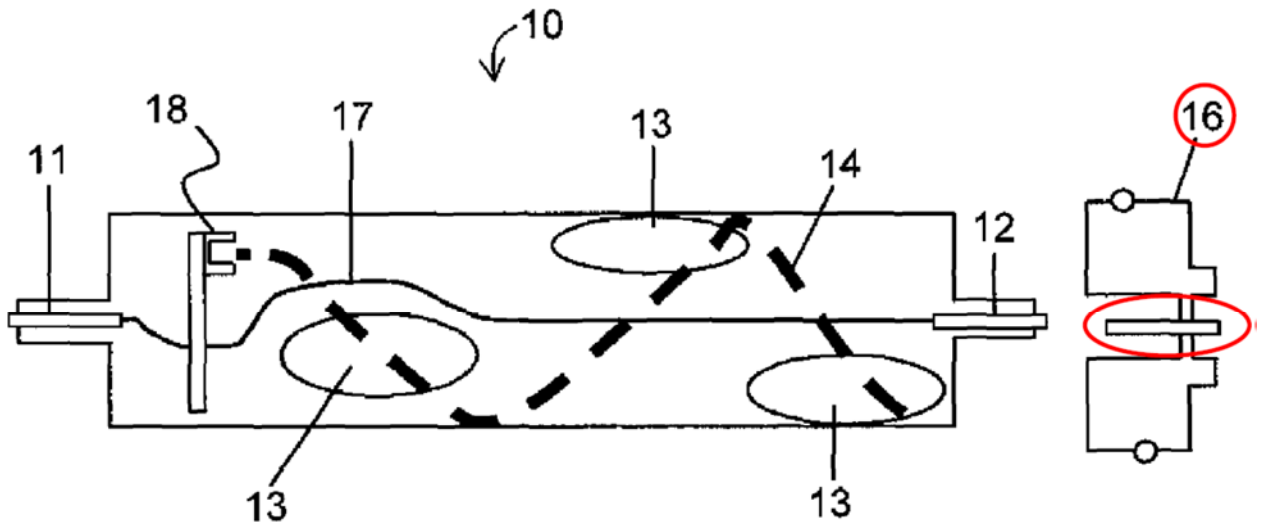


FIG. 1

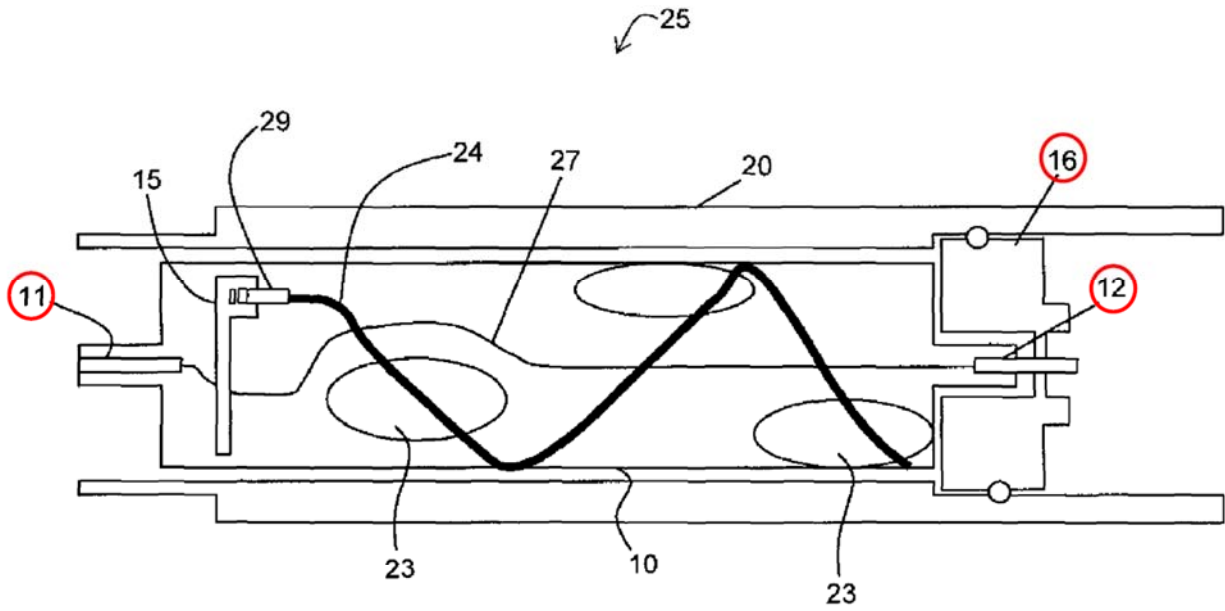


FIG. 2

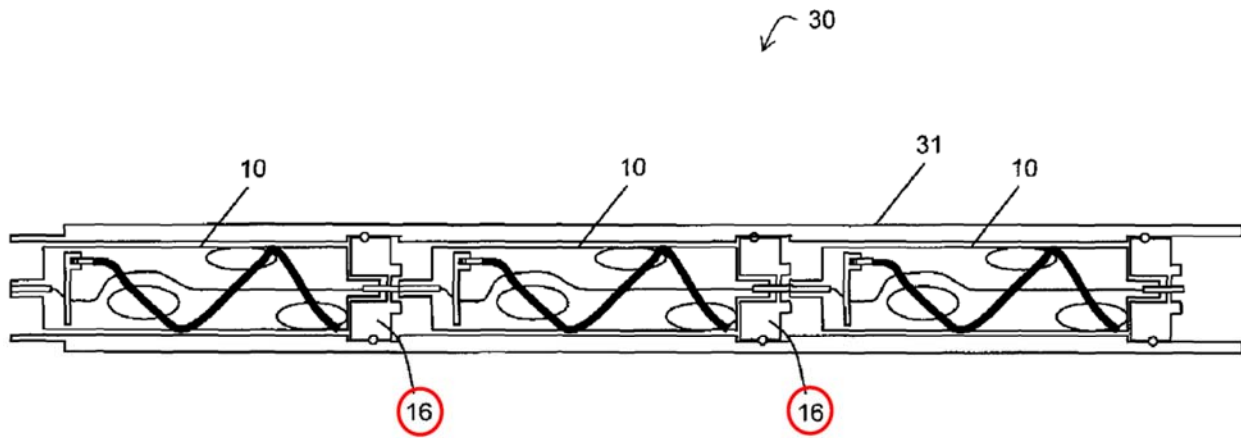


FIG. 3

Goodman teaches that pressure bulkhead 16, 49 seals the perforating guns. (Ex. 1018. ¶¶ 0021-22, 0026, FIGS. 2-5; Ex. 1007, Parrott, ¶ 484.)

Goodman's bulkhead 16 includes a ground contact in electrical contact with a ground contact of the detonator to function. (Ex. 1007, Parrott, ¶ 485.)

Therefore, Goodman teaches the claimed tandem. *Id.*

### **E. The Basic Perforating gun Elements**

The claims of the Patent include a number of limitations that are commonplace in perforating guns. These features are present in the common knowledge of a POSITA, explicit in the references cited below, and inherent in many others. (Ex. 1007, Parrott, ¶ 51.)

#### **1. Perforating Gun**

<b>Claim 1</b>	<b>Claim 9</b>	<b>Claim 13</b>
A perforating gun, comprising:	A modular detonator, comprising: ... when the modular detonator is received within a gun assembly of a perforating gun system,	A method for assembling a perforation gun system, comprising:

#### **a) Indefiniteness and construction of perforating gun limitations**

Because the Patent uses the terms perforating gun, perforating gun system, and perforation gun system interchangeably, they have the same meaning. (Ex. 1001, 5:38-40, 8:10-12; Ex. 1007, Parrott, ¶¶ 31-33.)

A POSITA would understand the terms “perforating gun”, “perforating gun system”, and “perforation gun system” to mean a device, assembly, or system for well bore perforating. (Ex. 1007, Parrott, ¶ 34.)

The specification provides a circular definition of “gun assembly”: “each gun assembly unit having all the components of a gun assembly,” and “assembling a plurality of the stackable charge holders in a predetermined phase to form a first gun assembly;” (Ex. 1001, 2:59-60, 7:63-67, 9:47-48; Ex. 1007, Parrott, ¶ 33.) From this a “gun assembly” could be a gun system, or a plurality of charge holders. *Id.*

Therefore, Claim 9 is indefinite. (*Id.* at ¶¶ 33, 381.)

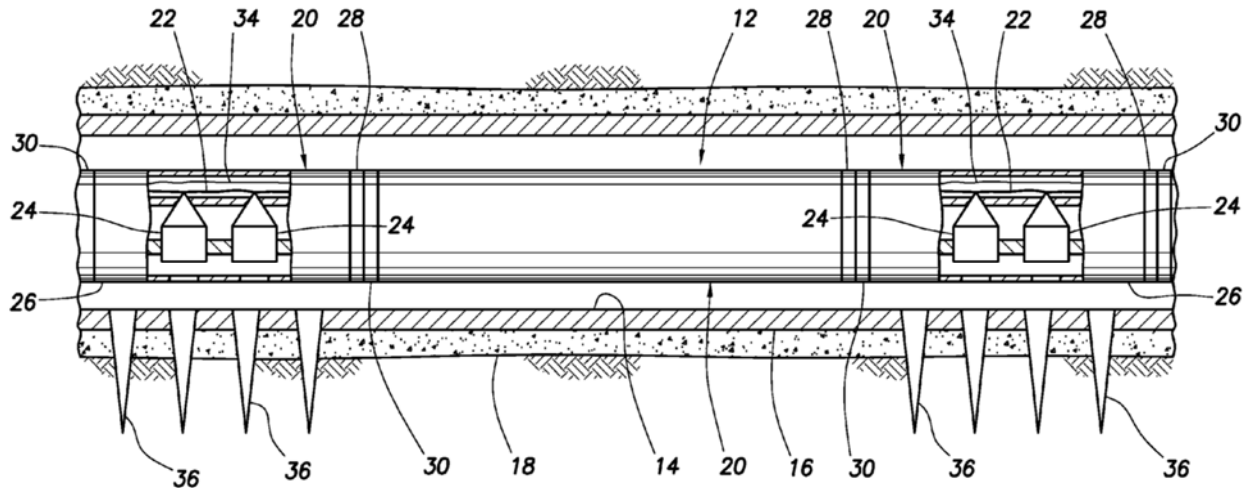
A POSITA’s best guess would be the “gun assembly” of Claim 9 is a device, assembly, or system for well bore perforating. (*Id.* at ¶¶ 33.)

**b) Common knowledge includes perforating guns**

A POSITA’s common knowledge includes the design, operation, and construction of perforating guns and their many common interchangeable variations. (Ex. 1007, Parrott, ¶ 51.) The ubiquity of these elements is shown by the teachings of additional references. (Ex. 1007, Parrott, ¶¶ 37, 42, 43, 45, 47-48, 50.)

**c) Schacherer teaches perforating guns**

Schacherer teaches the perforating gun limitations. (Ex. 1004, 1:7-16, 2:35-38, 7:5-15, 8:51-9:22, FIG. 1; Ex. 1007, Parrott, ¶¶ 35-36.)



**d) Harrigan teaches perforating guns**

Harrigan teaches the perforating gun limitations. (Ex. 1012, Abstract, FIGS. 1A, 1B, 2A, 4B, ¶¶ 0004-5, 0010-12, 0021-31, 0036, 0045; Ex. 1028, pp. 1-3, 7-8; Ex. 1007, Parrott, ¶ 38.)



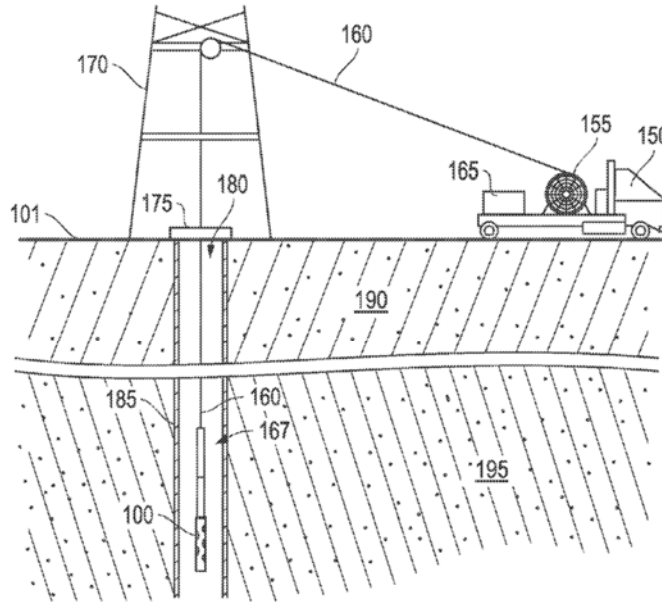


FIG. 1B

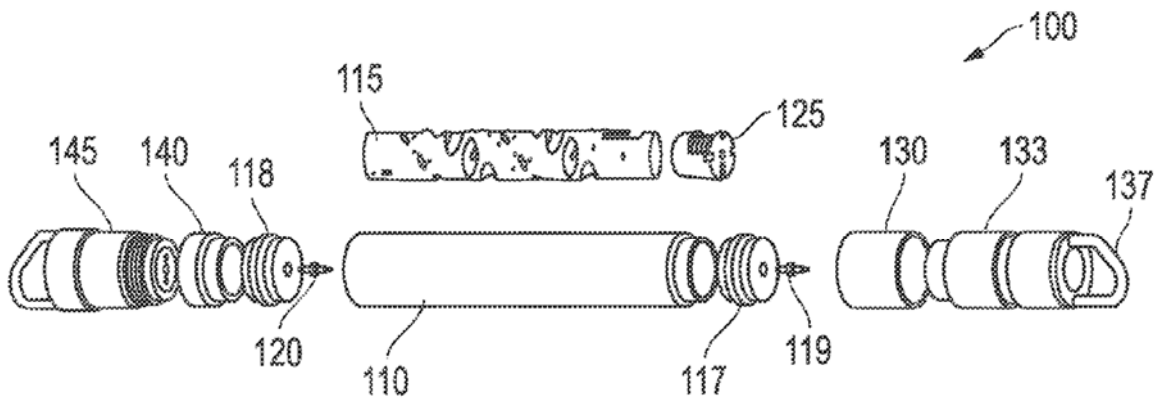


FIG. 1A

e) **Rogman teaches perforating guns**

Rogman teaches the perforating gun limitations. (Ex. 1014, Abstract, FIG. 3, ¶¶ 0001, 0005-7, 0011, 0015, 0018-22, 0027, 0035-36; Ex. 1020, pp. 1, 2, 6-8; Ex. 1007, Parrott, ¶¶ 39-40.)

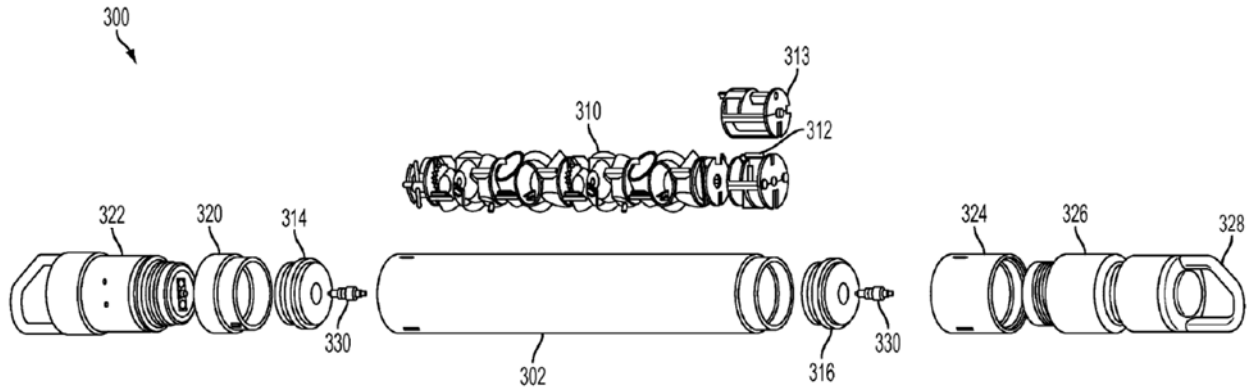


FIG. 3

**f) Lanclos teaches perforating guns**

Lanclos teaches the perforating gun limitations. (Ex. 1015, Abstract, FIGS.

1-5, 1:35-2:43, 4:44-60, 7:12-53; Ex. 1007, Parrott, ¶ 41.)

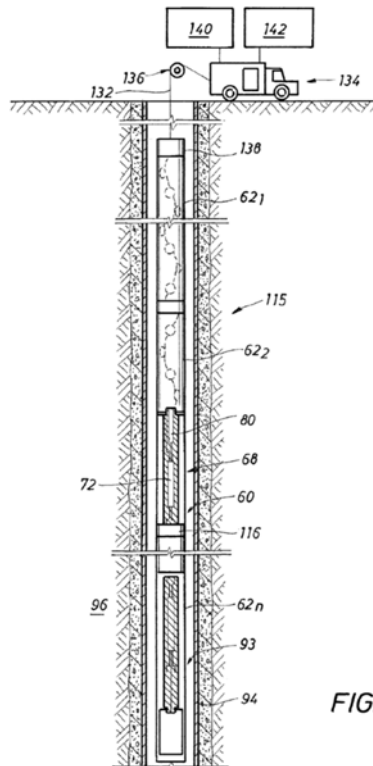


FIG. 5

**g) Goodman teaches perforating guns**

Goodman teaches the perforating gun limitations. (Ex. 1018, Abstract, ¶¶ 2, 4-7, 16, 17, 21, 22, 24-27, FIGS. 2-5; Ex. 1007, Parrott, ¶ 44.)

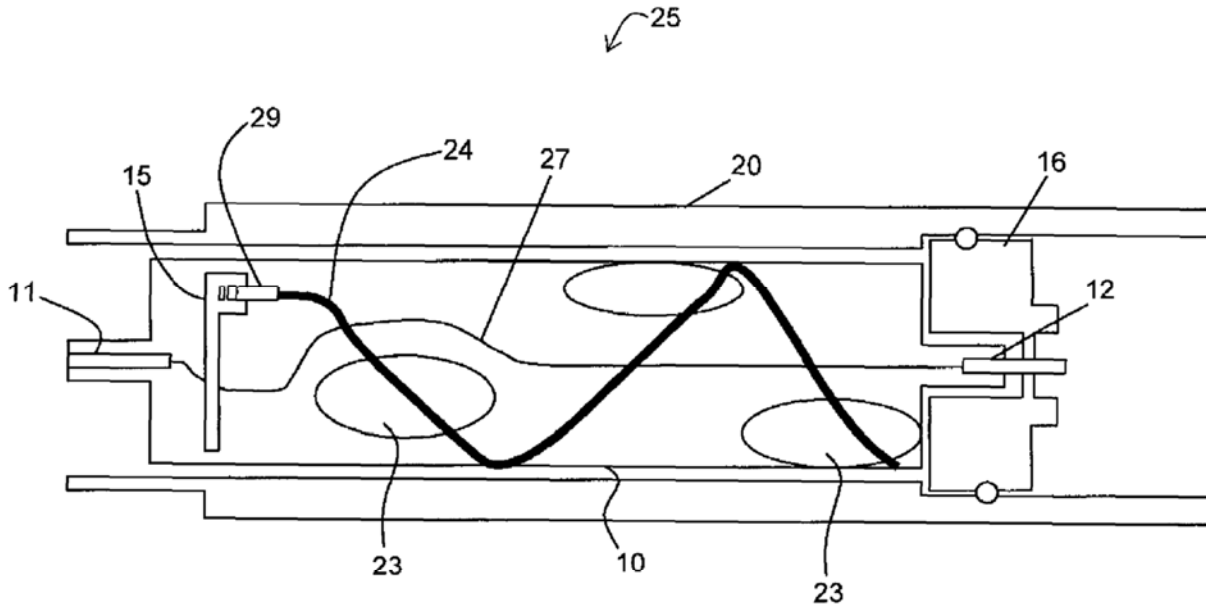
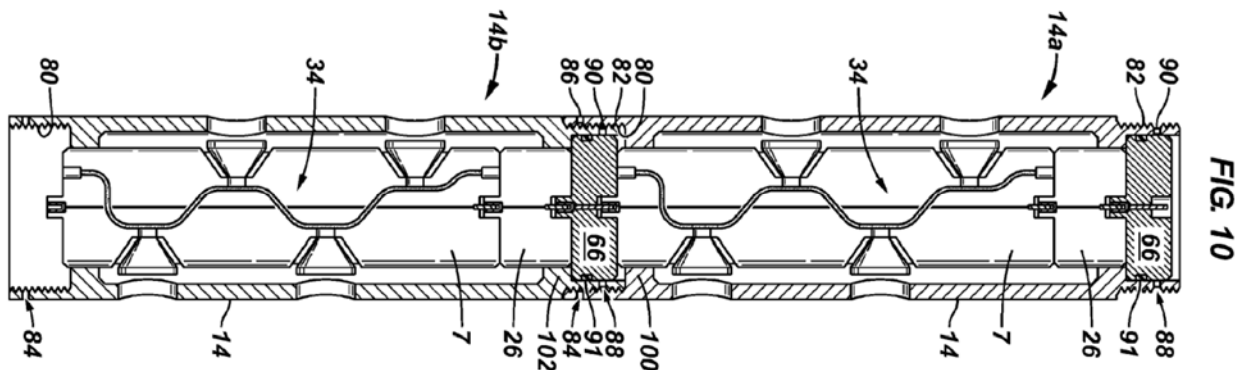


FIG. 2

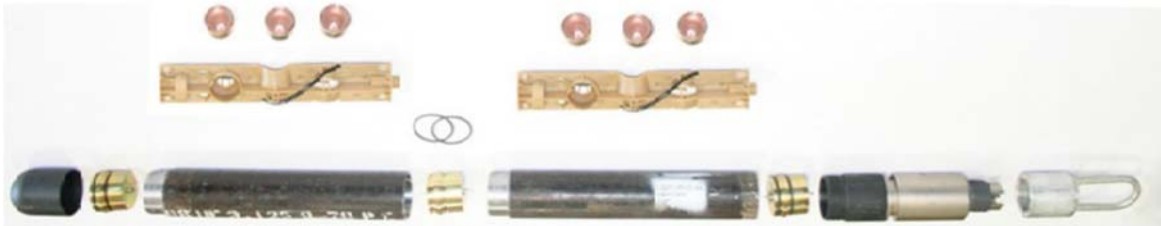
**h) Black teaches perforating guns**

Black teaches the perforating gun limitations. (Ex. 1002, Abstract, FIGS. 1-7, 10, ¶¶ 0004-8, 0011-20, 0023-25, 0035, 0040-41; Ex. 1007, Parrott, ¶ 46.)



**i) EWAPS teaches perforating guns**

EWAPS teaches the perforating gun limitations. (Ex. 1013, pp. 3-6, 8-10, 12; Ex. 1007, Parrott, ¶ 49.)



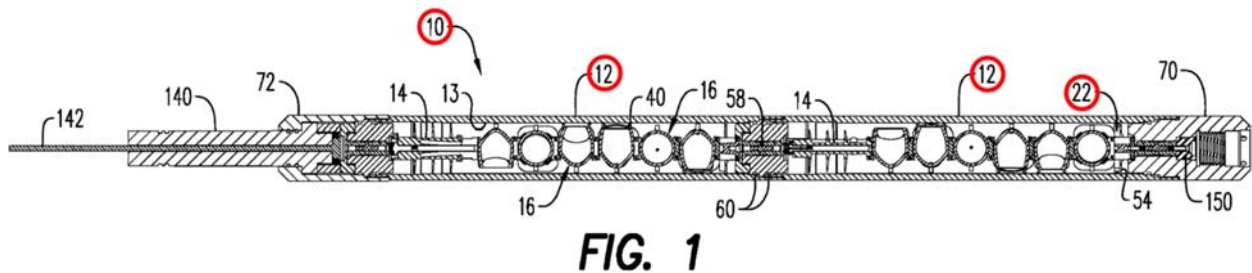
**2. Outer Gun Carrier**

<b>Claim 1</b>	<b>Claim 13</b>
An outer gun carrier	a hollow interior of an outer gun carrier,

**a) Construction of outer gun carrier**

The Patent discloses “an outer gun carrier 12.” (Ex. 1001, 5:39; Ex. 1007, Parrott, ¶ 53.)

The Patent refers to two separate pieces together as “an outer gun carrier.” (Ex. 1001, 5:38-40, FIG. 1, Ex. 1007, Parrott, ¶ 55.)



This is consistent with how the PTAB interpreted the similar limitation “a perforating gun housing” in IPR 2018-00600. (Ex. 1010, Final Written Decision, pp. 26-28; Ex. 1007, Parrott, ¶ 56.)

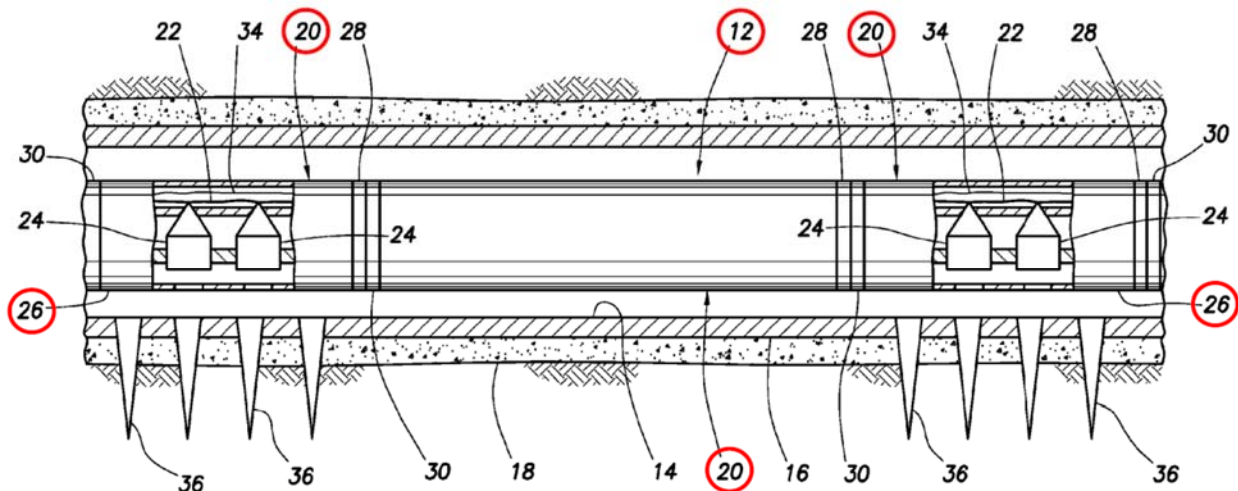
A POSITA would understand the term “an outer gun carrier” in the claims of the Patent to include both single piece and multiple piece tubular housings. (Ex. 1007, Parrott, ¶¶ 53-57.)

**b) Common knowledge includes carriers**

A POSITA’s common knowledge includes the design, operation, and construction of perforating guns with tubular carriers. (Ex. 1007, Parrott, ¶¶ 78-82.) The ubiquity of carriers is shown by the teachings of additional references. (Ex. 1007, Parrott, ¶¶ 62, 68-70, 72, 74-75, 77.)

**c) Schacherer teaches a carrier**

Schacherer teaches explosive assemblies 20 (perforating guns) with outer housings 26. (Ex. 1004, FIGS. 1, 2:25-40; Ex. 1007, Parrott, ¶ 59.)



**FIG. 1**

Schacherer teaches that outer housing 26 and connector 30 together serve as a carrier for perforating charges and a detonator assembly for transport, as found by the PTAB. (Ex. 1004, 2:35–36, 3:30–43, 8:4–14, FIGS. 2, 4-5, 8; Ex. 1010, Final Written Decision, p. 28; Ex. 1007, Parrott, ¶ 60.)

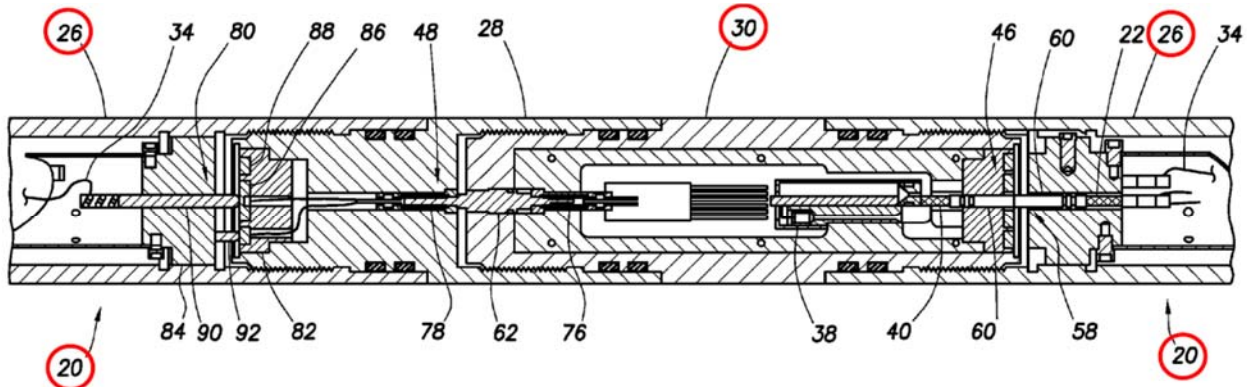
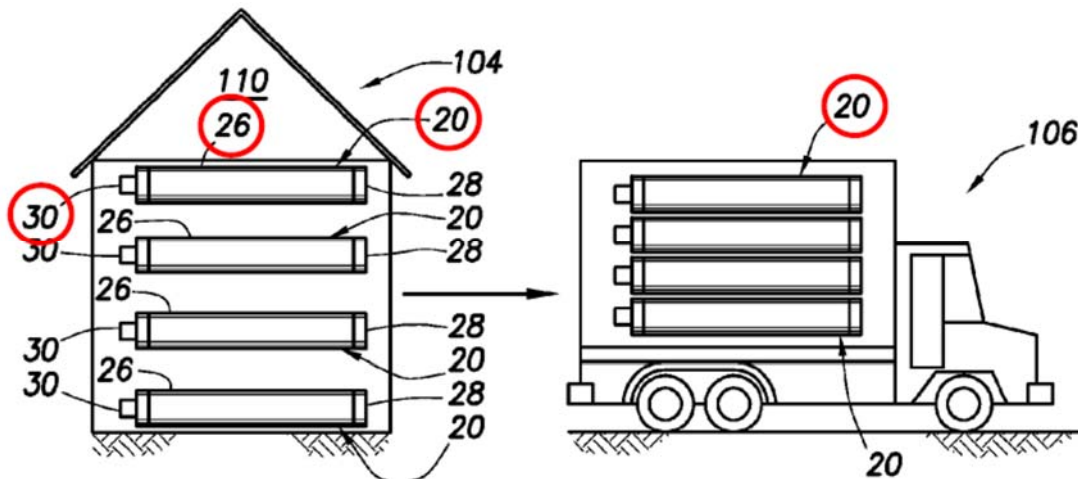


FIG. 5

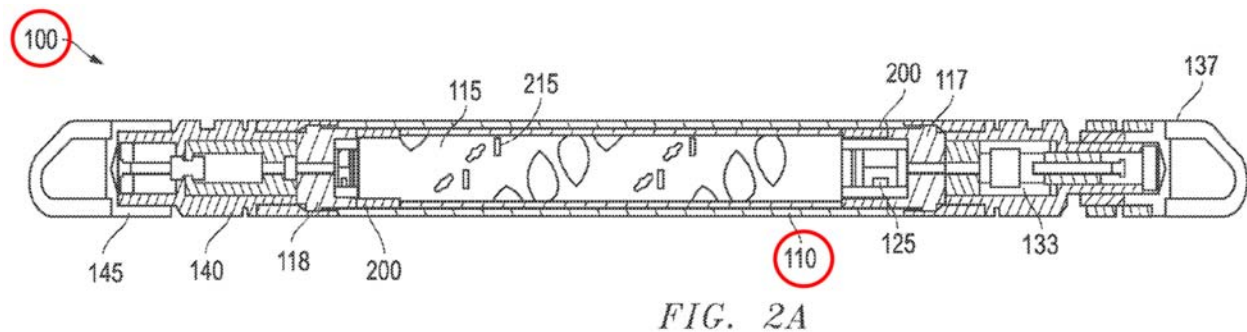
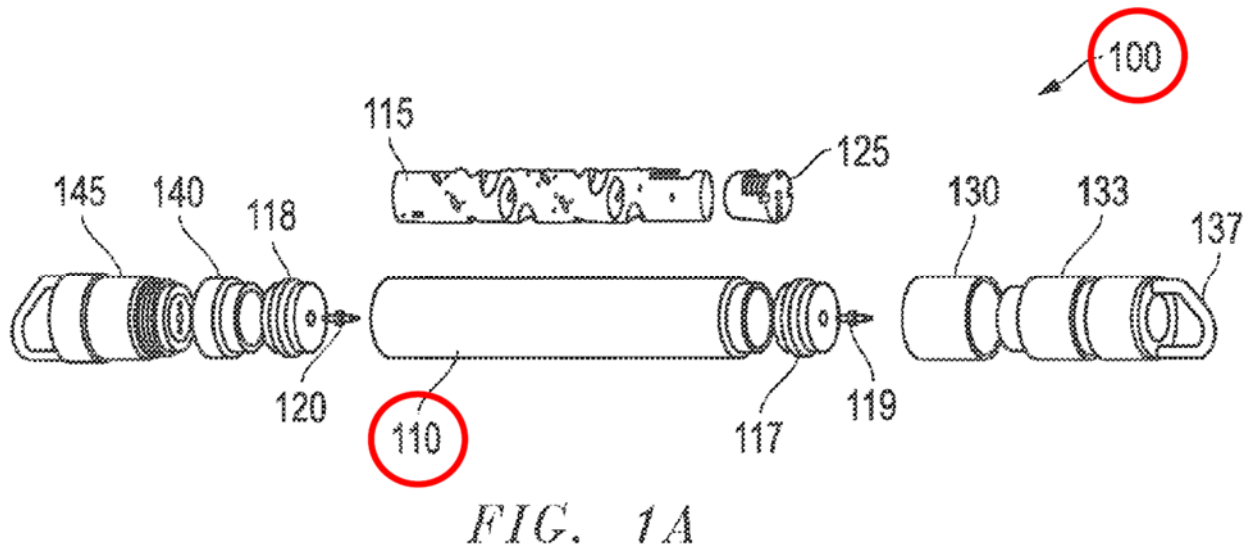


Therefore, Schacherer teaches the claimed gun carrier. (Ex. 1007, Parrott, ¶

61.)

**d) Harrigan teaches a carrier**

Harrigan teaches a tubular carrier 110 having a hollow interior as claimed. (Ex. 1012, ¶¶ 0007, 0010, 0022, 0033, 0036, FIGS. 1A, 2A; Ex. 1028, pp. 1-3; Ex. 1007, Parrott, ¶ 63.)



**e) Rogman teaches a carrier**

Rogman teaches a tubular body or carrier 102 and 302 having a hollow interior as claimed. (Ex. 1014, ¶¶ 0015, 0027, FIGS. 1, 3; Ex. 1020, pp. 1, 2, FIGS. 1, 3, 6, 7; Ex. 1007, Parrott, ¶¶ 64, 65.)

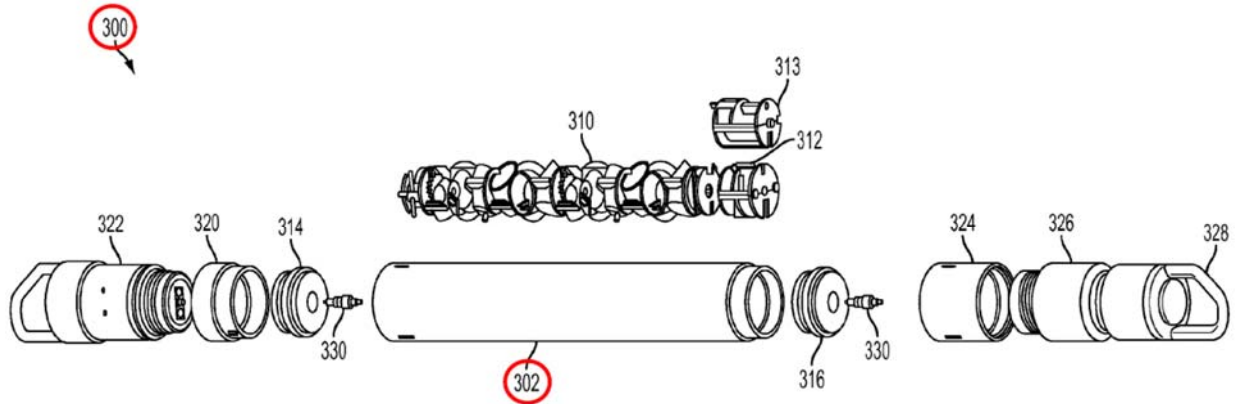
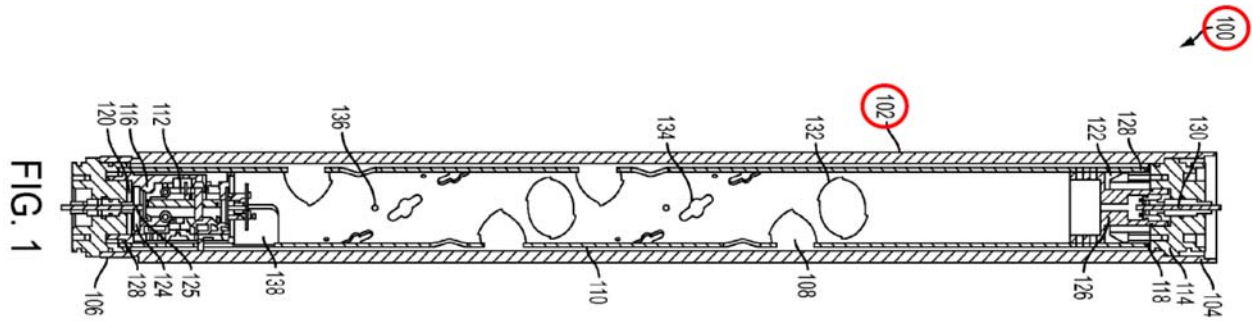


FIG. 3

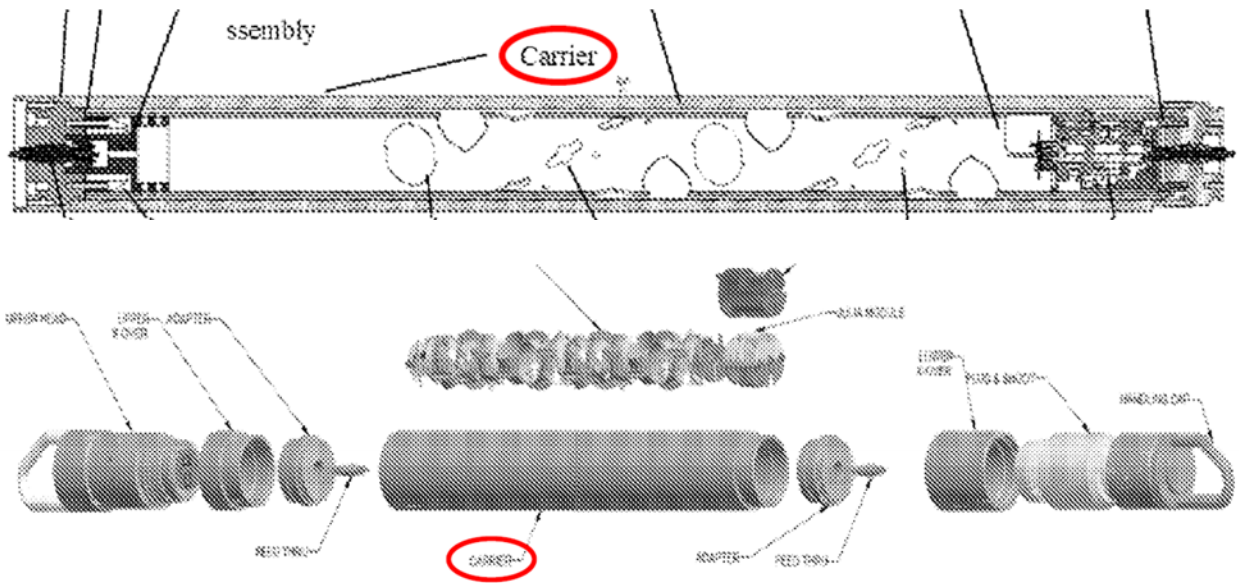
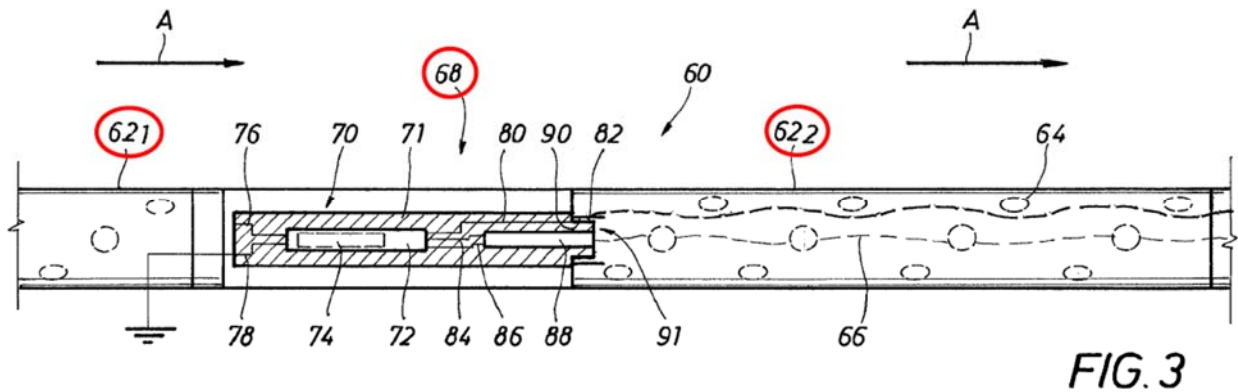


Fig. 3: Overview of the Gun system (shown with previous plastic loading tube design)

**f) Lanclos teaches a carrier**

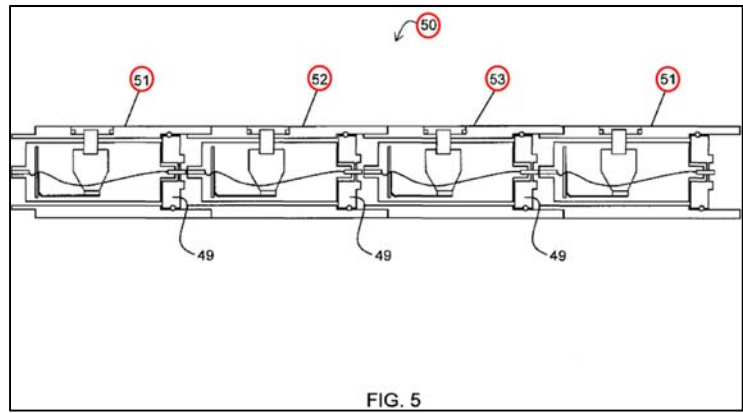
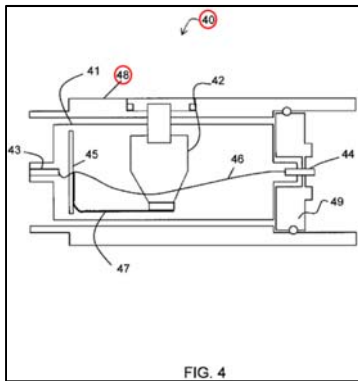
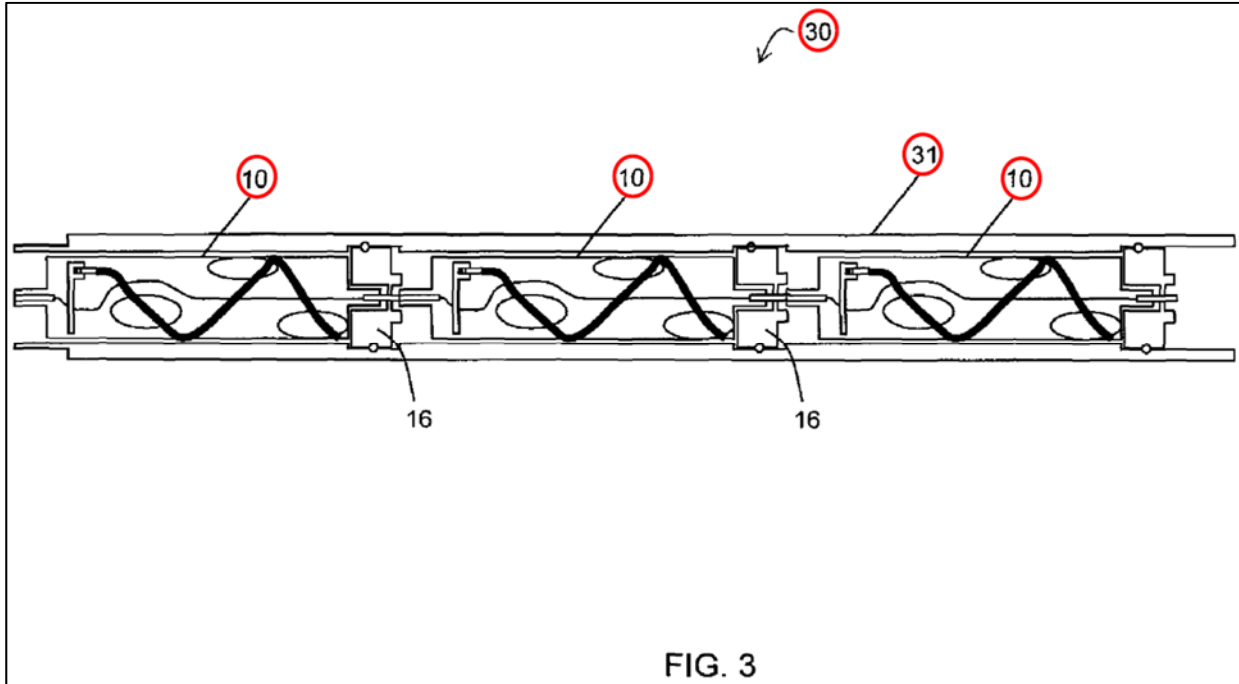


Lanclos teaches perforating guns 62<sub>1</sub> and 62<sub>2</sub>, with a tubular carrier having a hollow interior as claimed. (Ex. 1015, 4:44-5:23, FIGS. 3-5; Ex. 1007, Parrott, ¶¶ 66-67.) The combination of either of those housings with cartridge sub 68, is also a tubular housing with a hollow interior teach a carrier as claimed. (Ex. 1015, 4:44-5:23, FIGS. 3-5; Ex. 1007, Parrott, ¶¶ 66-67.)



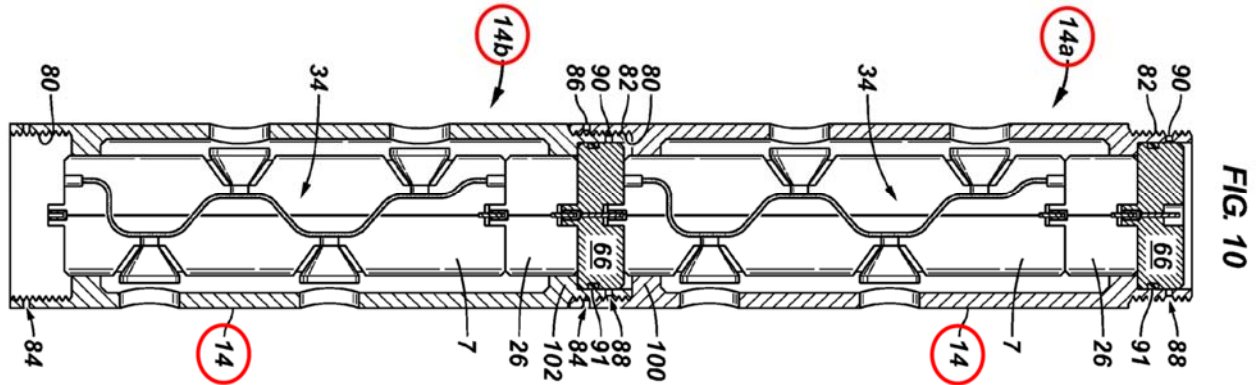
**g) Goodman teaches a carrier**

Goodman teaches tubular carriers 31 and 48 having a hollow interior as claimed. (Ex. 1018, ¶¶ 0006-7, 0018, 0022, 0024-26, FIGS. 2-5; Ex. 1007, Parrott, ¶ 71.) Goodman acknowledges and teaches multi-piece carriers. (Ex. 1007, Parrott, ¶ 71.)



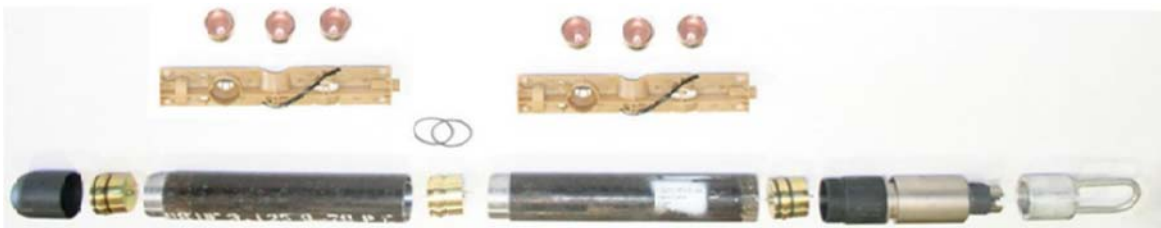
**h) Black teaches a carrier**

Black teaches a tubular carrier 14 having a hollow interior as claimed. (Ex. 1002, ¶¶ 0004, 0007, 0020, 0023, 0026, FIGS. 1-2, 4, 6-7, 10; Ex. 1007, Parrott, ¶ 73.) Black teaches a carrier with multiple sections/portions 14a, 14b. (Ex. 1002, ¶¶ 0020, 0035-39, 0041, FIG. 10; Ex. 1007, Parrott, ¶ 73.)



**i) EWAPS teaches a carrier**

EWAPS teaches a tubular carrier having a hollow interior as claimed. (Ex. 1013, pp. 4, 6, 8, 9, 12; Ex. 1007, Parrott, ¶ 76.)



**3. Charge Holder**

Claim 1	Claim 13
a charge holder positioned within the outer gun carrier and including at least one shaped charge;	(a) inserting a charge holder within a hollow interior of an outer gun carrier, wherein the charge holder includes a detonating cord connected to the charge holder and at least one shaped charge;

**a) Construction of charge holder and lack of written description**

The plain and ordinary meaning of a charge holder is a device holding a shaped charge inside a gun carrier (and including a detonating cord for Claim 13.) (Ex. 1007, Parrott, ¶ 84.)

The written description indicates that the applicant did not have possession of a charge holder with multiple charges, but only the narrower “single charge holder ... [holding] a single shaped charge.” (Ex. 1001, 5:62-63; Ex. 1007, Parrott, ¶ 85.)

Regarding Claim 13, the Patent never discloses a charge holder that “includes a detonating cord.” (Ex. 1007, Parrott, ¶ 86.) Therefore, the Patent does not contain a written description that would indicate to a POSITA that the applicant had possession of a charge holder that “includes a detonating cord.” (Ex. 1007, Parrott, ¶ 86.)

**b) Common knowledge includes charge holders**

Common knowledge includes that a hollow carrier perforating gun includes a carrying device for holding one or more shaped charges along with detonating cord. (Ex. 1007, Parrott, ¶¶ 87-89.)

The ubiquity of charge holders is shown by the teachings of additional references. (Ex. 1007, Parrott, ¶¶ 98, 100, 103, 106.)

**c) Schacherer teaches charge holders**

Schacherer teaches a charge holder (eccentric weight 42) holding a shaped charge (explosive component 24) and detonating cord (explosive component 22).

(Ex. 1004, 3:9-15, 3:22-29, 3:60-4:4, 4:7-10, FIGS. 1, 2; Ex. 1007, Parrott, ¶¶ 91-92.)

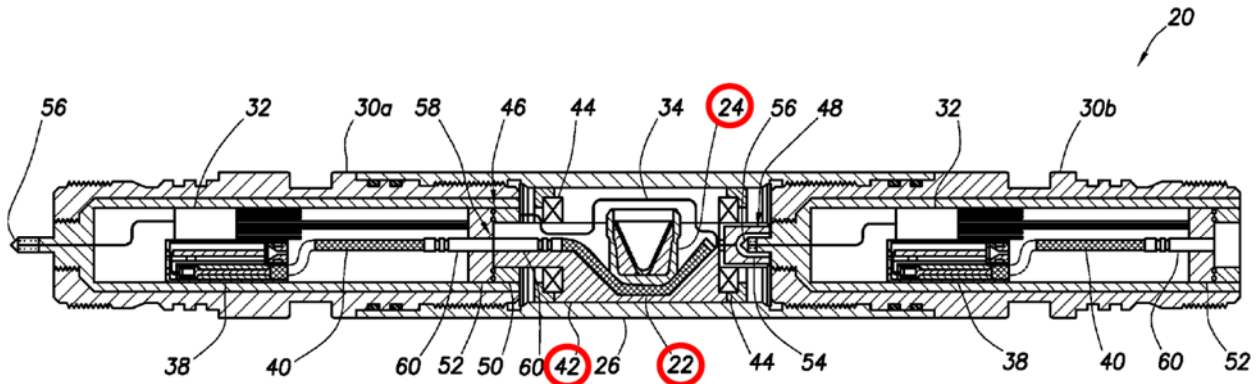


FIG.2

Schacherer also teaches typical shaped charge loading tubes with detonating cord 22 inside the housing 26. (Ex. 1004, 5:37-51, FIG. 5; Ex. 1007, Parrott, ¶ 93.)

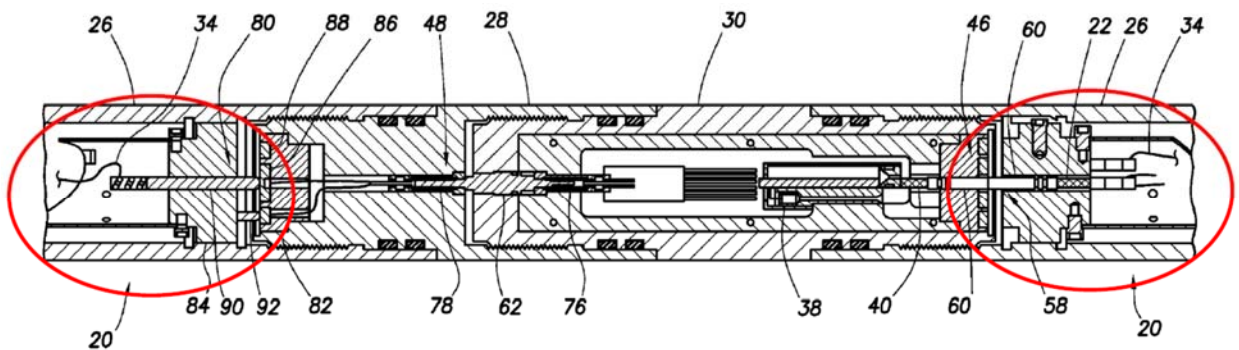


FIG.5

**d) Harrigan teaches charge holders**

Harrigan teaches a charge holder (loading tube 115) inside a carrier holding shaped charges and detonating cord. (Ex. 1012, ¶¶ 0007, 0022, 0024, 0042, FIGS. 1, 2A, 4B; Ex. 1028, pp. 1-3, 5-7; Ex. 1007, Parrott, ¶ 94.) A POSITA would find

detonating cord attached to the shaped charges, loading tube 115, and detonator inherent in Harrigan because that is standard practice and required to make Harrigan functional. *Id.*

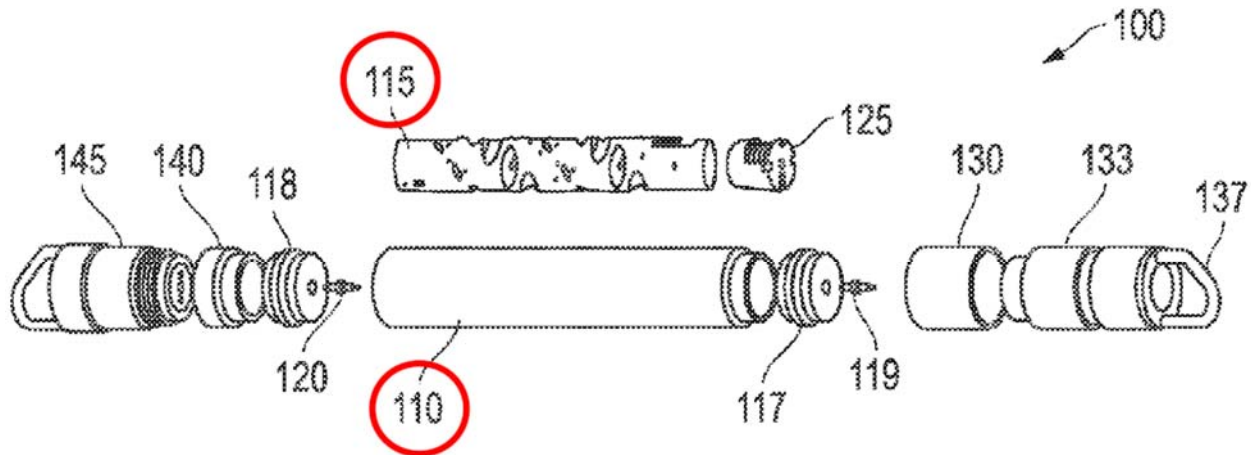


FIG. 1A

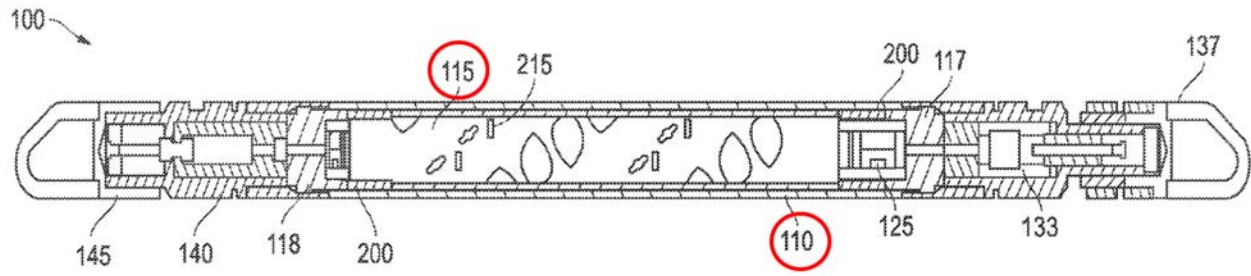


FIG. 2A

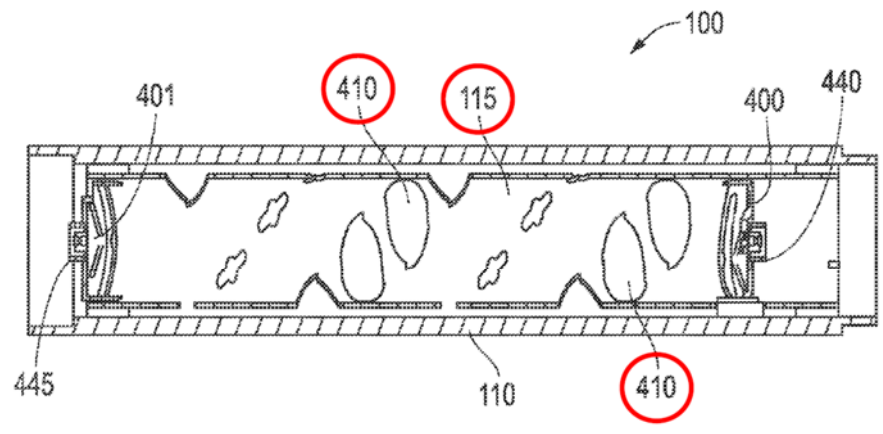


FIG. 4B

e) **Rogman teaches charge holders**

Rogman teaches a charge holder (loading tube 110, 310) inside an outer gun carrier holding shaped charges and detonator cord, teaching the claimed charge holder. (Ex. 1014, ¶¶ 0005, 0006, 0020, 0025, 0029, 0036, FIGS. 1-4; Ex. 1020, pp. 1-7, FIGS. 1-6; Ex. 1007, Parrott, ¶¶ 95-96.)

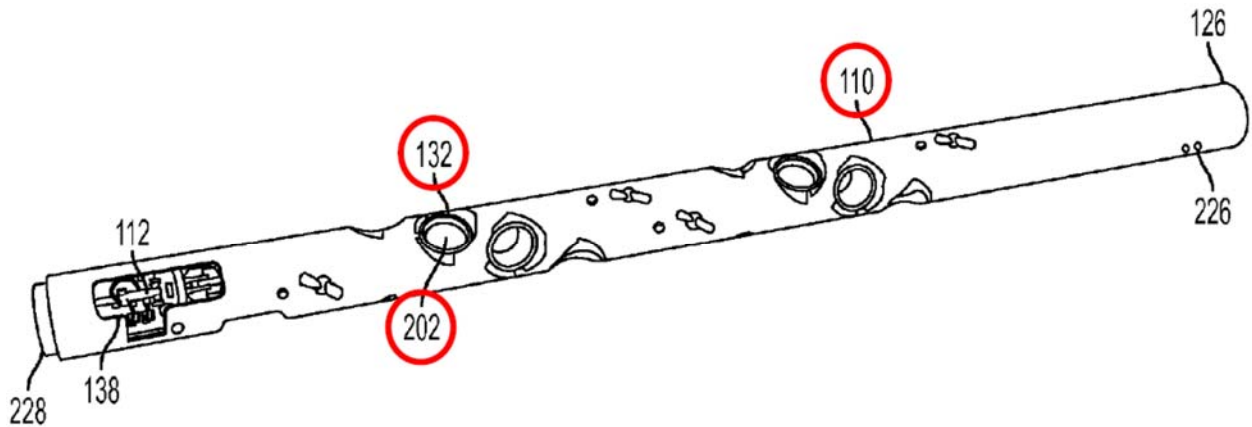
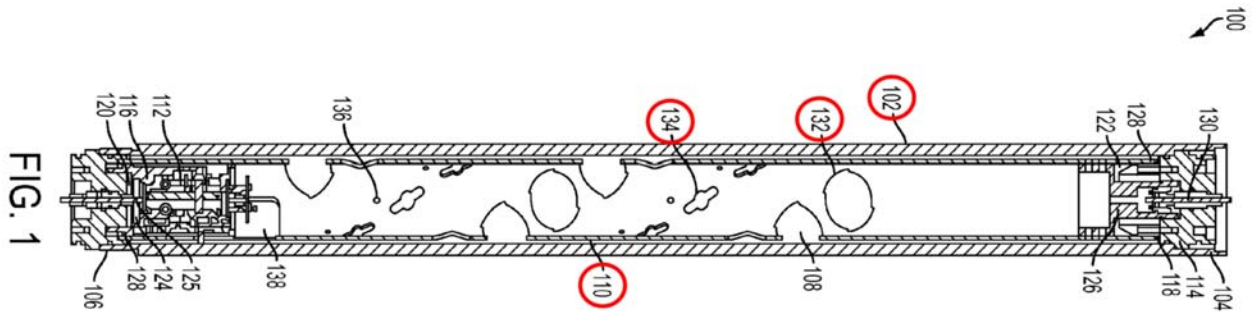


FIG. 2

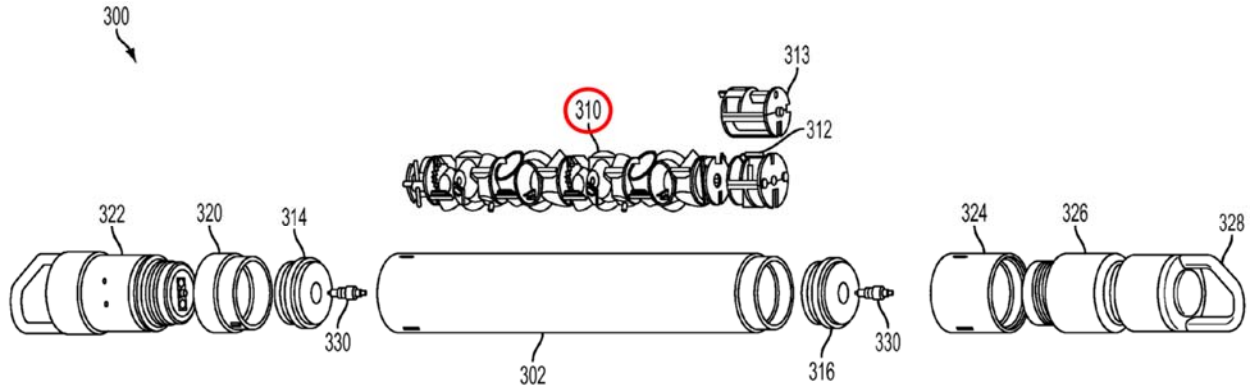
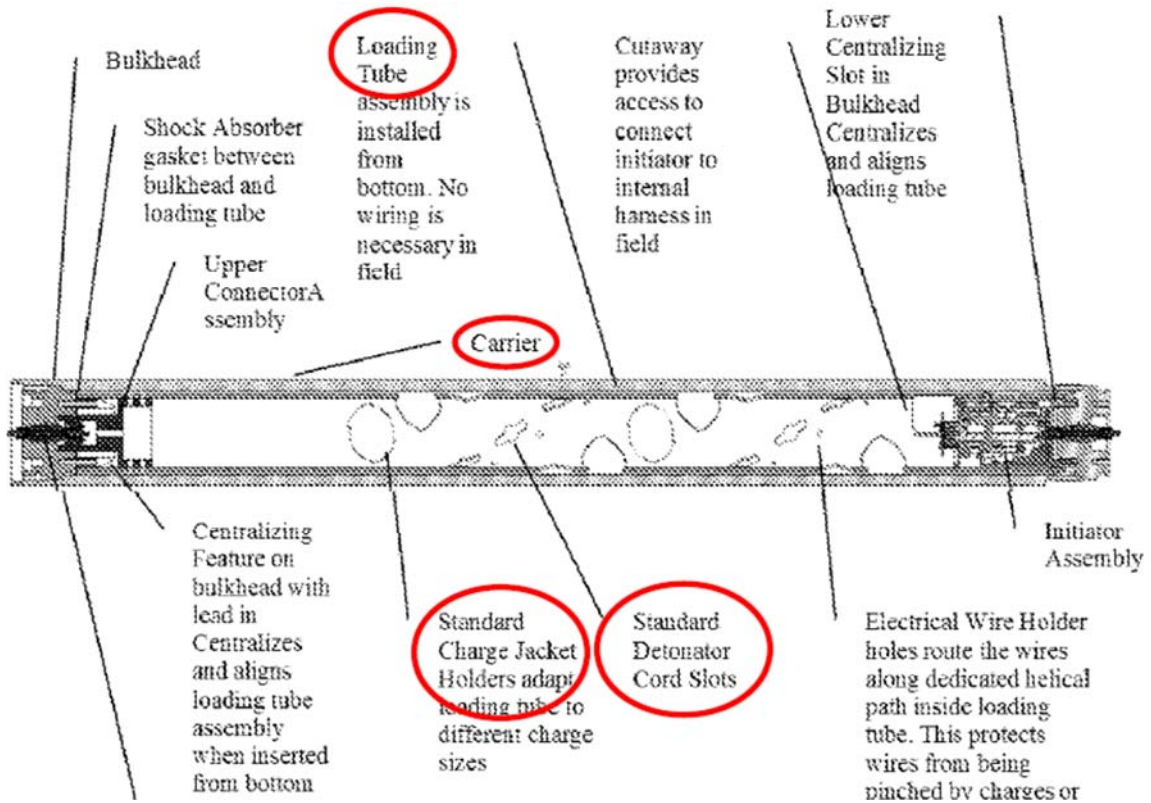
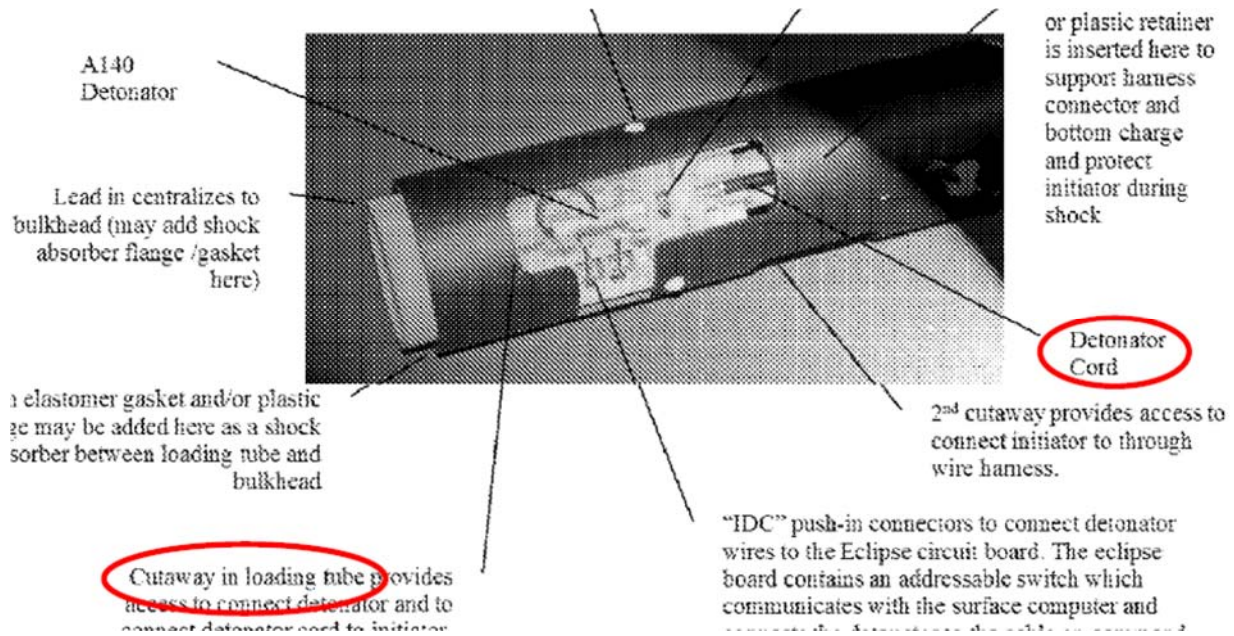


FIG. 3

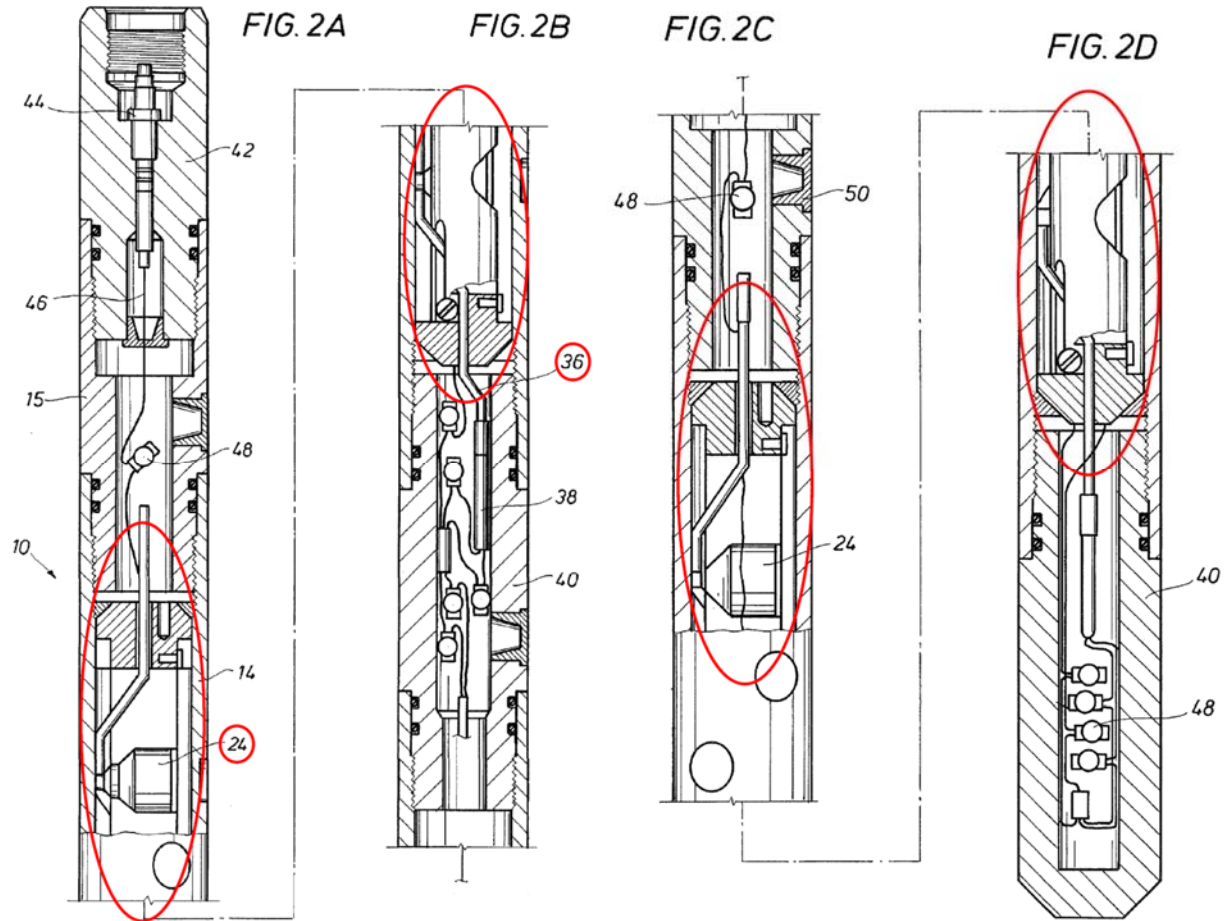






**f) Lanclos teaches charge holders**

Lanclos teaches typical tubular loading tubes holding charges 24 and detonating cord 36 inside a carrier. (Ex. 1015, 1:63-2:21, FIGS. 2A-D; Ex. 1007, Parrott, ¶ 97.) A POSITA would understand such a loading tube would also be in the carrier of FIG. 3. (Ex. 1007, Parrott, ¶ 97.) Therefore, Lanclos teaches the claimed charge holder. *Id.*



**g) Goodman teaches charge holders**

Goodman teaches charge holders (loading tube 10) inside a carrier holding shaped charges 23, 42 and detonator cord 24, 47, teaching the claimed charge holder. (Ex. 1018, ¶¶ 0005-7, 0018-20, 0022, 0024-26, FIGS. 1-5; Ex. 1007, Parrott, ¶ 99.)

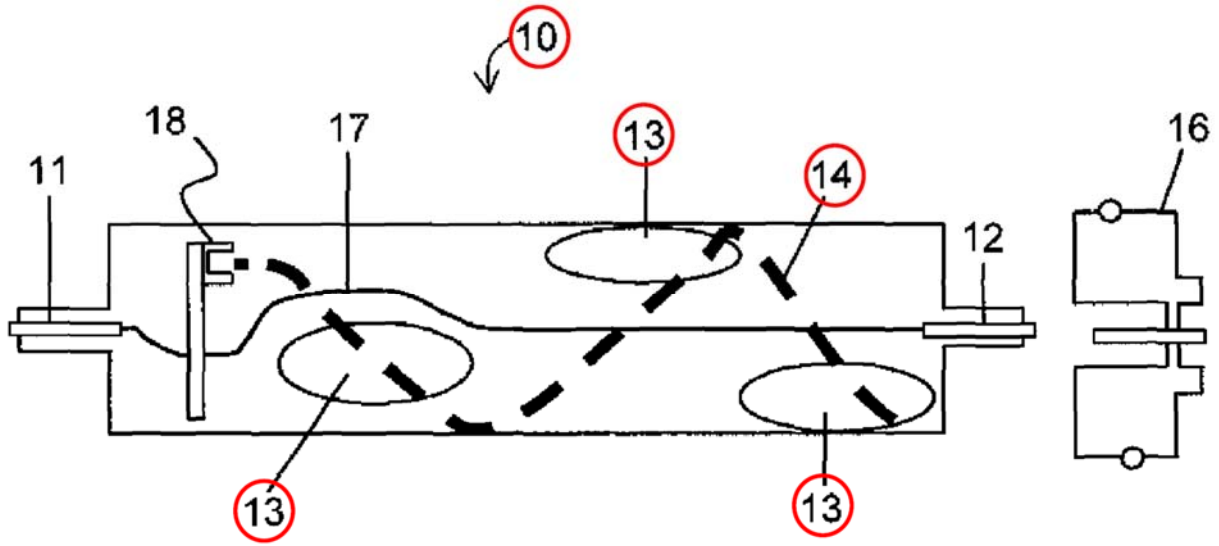


FIG. 1

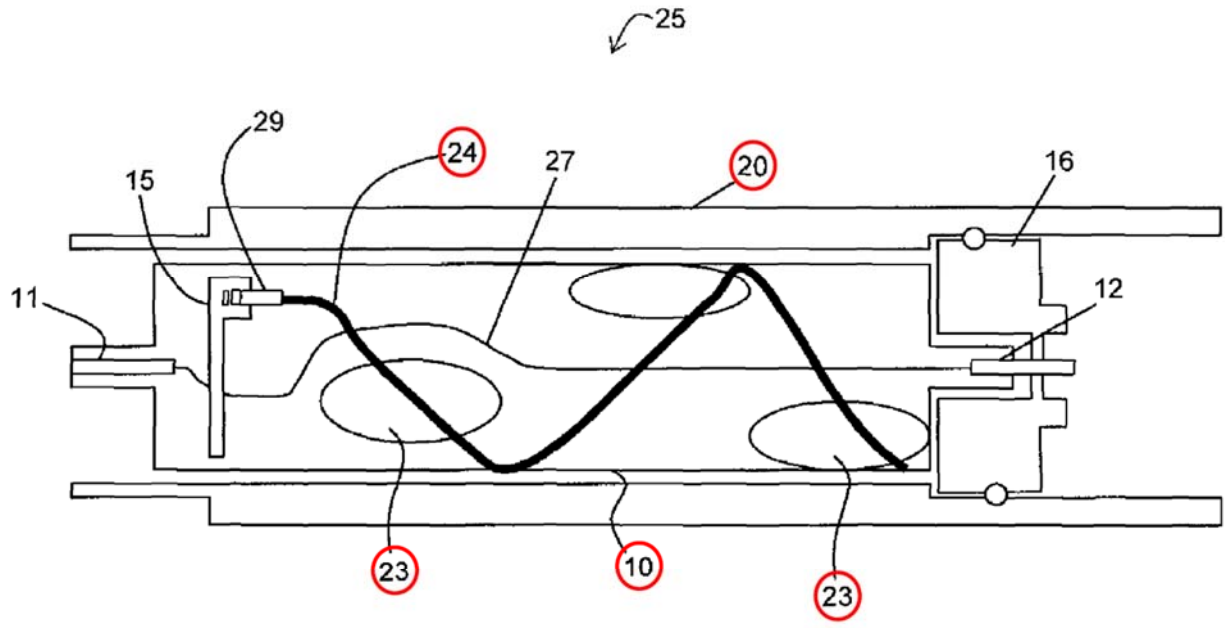


FIG. 2

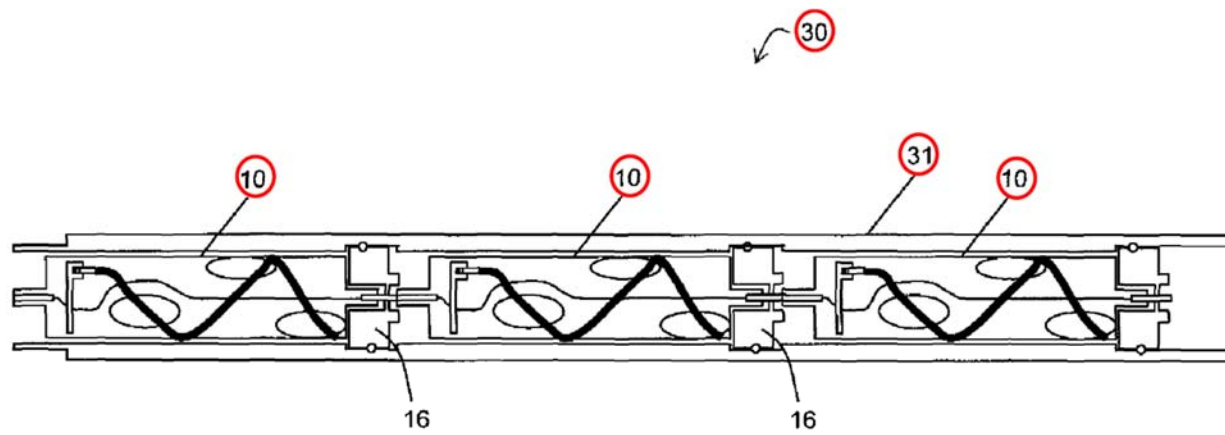


FIG. 3

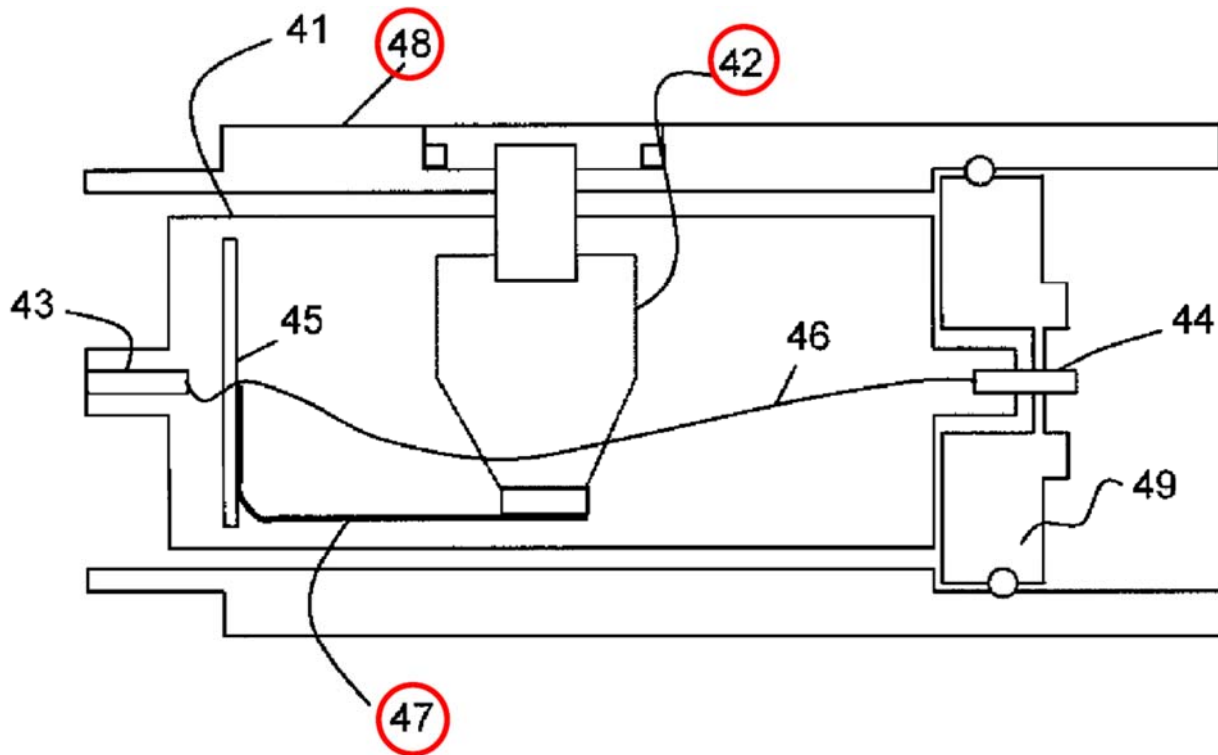
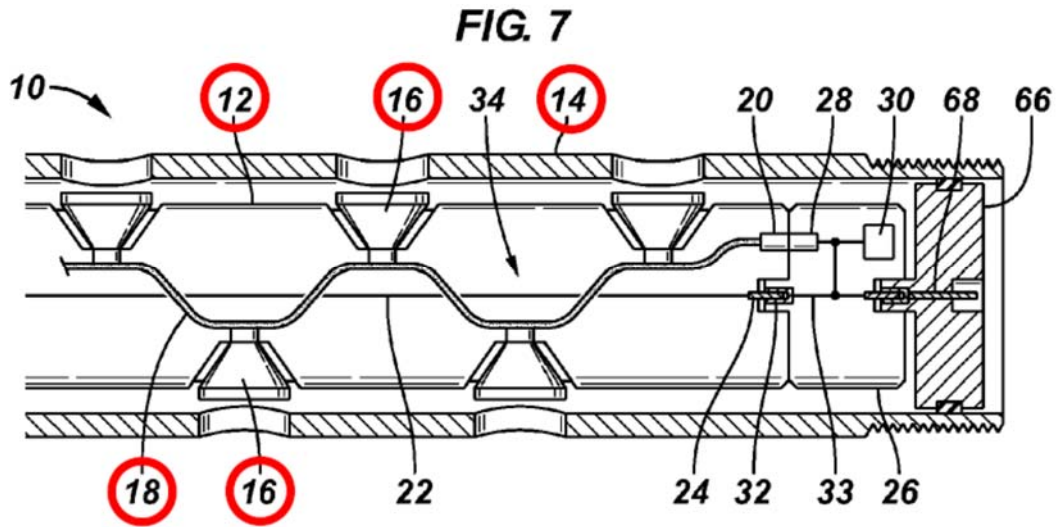


FIG. 4

**h) Black teaches charge holders**

Black teaches a charge holder (loading tube 7, 12) inside a carrier holding shaped charges 16 and detonating cord 18, teaching the claimed charge holder. (Ex. 1002, ¶¶ 0004-8, 0023-27, 0034, 0038, FIGS. 1, 2, 4, 6-7, 10; Ex. 1007, Parrott, ¶ 102.)



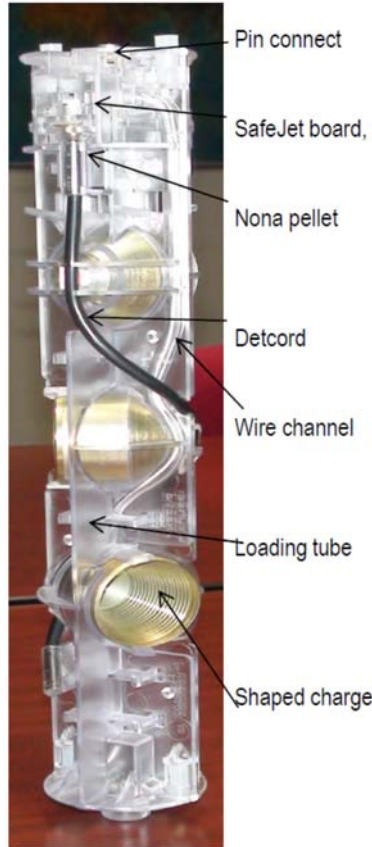
**i) EWAPS teaches charge holders**

EWAPS teaches a charge holder (loading tube) inside an outer gun carrier holding shaped charges and detonating cord, teaching the claimed charge holder.

(Ex. 1013, pp. 4, 9, 10, 12; Ex. 1007, Parrott, ¶ 105.)



Pre-assembled with wiring and detonator cord - no booster, no crimping



**4. Detonator in a Top Connector**

Claim 13	Claim 5
(b) inserting a top connector into the outer gun carrier adjacent to the charge holder, the top connector comprising a hollow channel;	
(c) inserting a detonator into the hollow channel of the top connector,	a top connector, wherein the detonator is positioned within the top connector.

**a) Indefiniteness and Construction of top connector**

The term “top connector” has no standard meaning. (Ex. 1007, Parrott, ¶ 108.)

The Patent is unclear as to whether a top connector must be a separate component or whether the limitation can be met by other claimed components, such

as a charge holder, a carrier, or a detonator body as Patent Owner has alleged infringement. (Ex. 1006, Infringement Contentions, p. 14; Ex. 1007, Parrott, ¶ 111.)

Therefore, Claims 5 and 13 are indefinite. *Id.*

A POSITA's best guess for the meaning of Claim 5 would be "a component with the detonator at least partially within it." (*Id.* at ¶ 113.)

Because the Patent does not describe a channel in the top connector, its meaning is not clear to a POSITA, rendering Claim 13 indefinite. (Ex. 1001, 7:36-42; Ex. 1007, Parrott, ¶¶ 114-15.)

A POSITA's best guess for the meaning of Claim 13 step b) would be "inserting a component, with a recess or opening that can receive a detonator at least partially within it, at least partially into the outer gun carrier adjacent to the charge holder," and step c) "inserting a detonator at least partially into that component." (Ex. 1007, Parrott, ¶ 117.)

**b) The Background acknowledges a top connector as prior art**

The Patent describes prior art perforating guns as having "a detonating cord ... coupled to a detonator," the function of the top connector. (Ex. 1001, 1:40-42, 1:49-53, 6:19-20; Ex. 1007, Parrott, ¶ 118.)

**c) Common knowledge includes a top connector**

A POSITA's common knowledge would include that a functional perforating gun requires a detonator would be inserted into a component that would be inserted



into a carrier and couple the detonator to a detonating cord. (Ex. 1007, Parrott, ¶¶ 119-120.) Therefore, common knowledge teaches the claimed top connector. *Id.*

Top connector's ubiquity is taught in additional references. (Ex. 1007, Parrott, ¶¶ 161, 165, 166.)

**d) Schacherer teaches a top connector**

Schacherer teaches a detonator inserted within connector 30, which is inserted in carrier adjacent the charge holder and couple the detonator to detonating cord. (Ex. 1004, 1:23-27, 3:33-36, 4:40-48, 5:47-51, 6:37-41, 6:57-59, 7:27-33, 9:49-50, 9:64-67, 10:19-21, 10:46-49, FIGS. 2, 4, 5, 7; Ex. 1007, Parrott, ¶¶ 128, 133.)

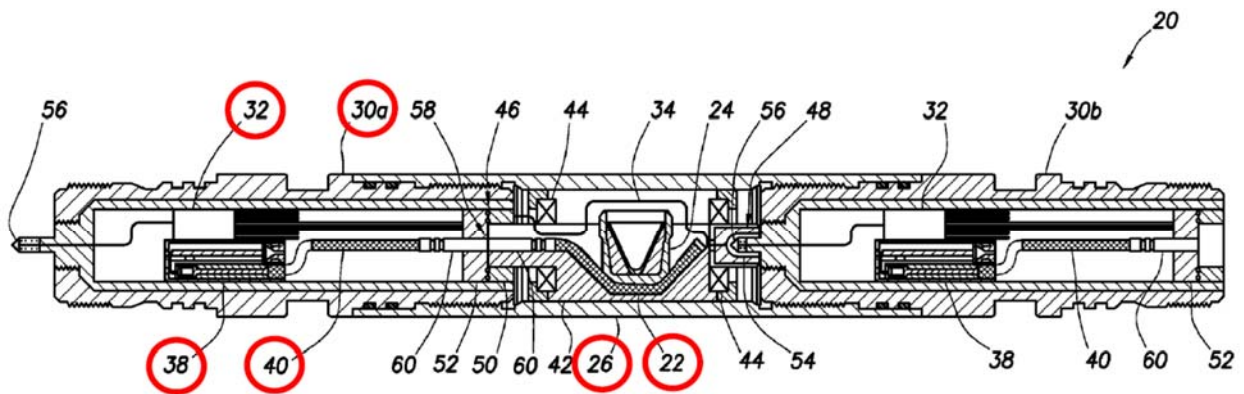


FIG.2

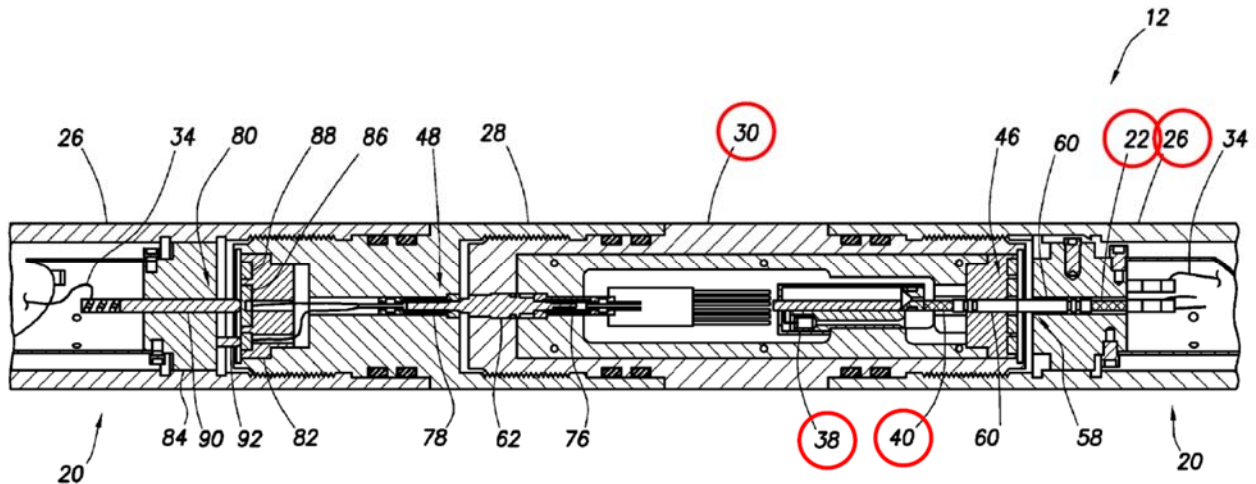


FIG.5

Each of the items in Schacherer discussed above as teaching a detonator body also teach the claimed top connector because they all hold a detonator and couple it to detonating cord and are within the carrier. (Ex. 1004, 6:37-41; Ex. 1007, Parrott, ¶¶ 129-30.)

Schacherer also teaches a top connector in the bodies of 46 and 58 in FIGS. 2, 5, and 7 and that body is inserted within the carrier and couples the detonator to detonating cord. (Ex. 1004, FIGS. 2, 5, 7; Ex. 1007, Parrott, ¶ 131.)

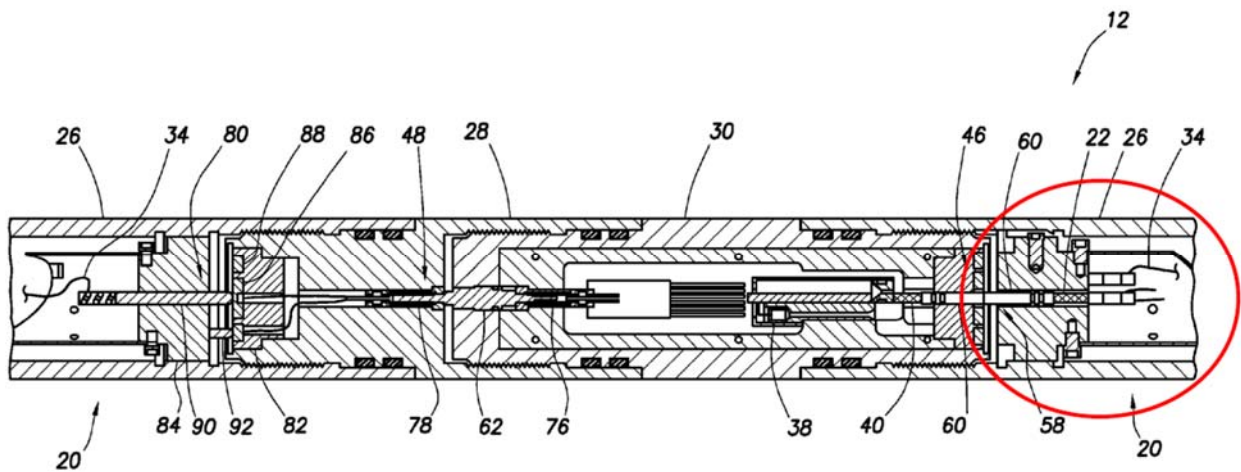


FIG.5

A POSITA would recognize and conclude that Schacherer teaches the top connector of Claims 5 and 13. (Ex. 1007, Parrott, ¶¶ 128-33.)

**e) Harrigan teaches a top connector**

Harrigan teaches initiator assembly 125 module plugged into loading tube 115 and both held in place within the carrier by centralizing rings 200 and bulkheads. (Ex. 1012, ¶¶ 0033-34, 0038, 0045; FIGS. 2A-B, 3A; Ex. 1028, pp. 1, 3-5, 7; Ex. 1007, Parrott, ¶ 135.)

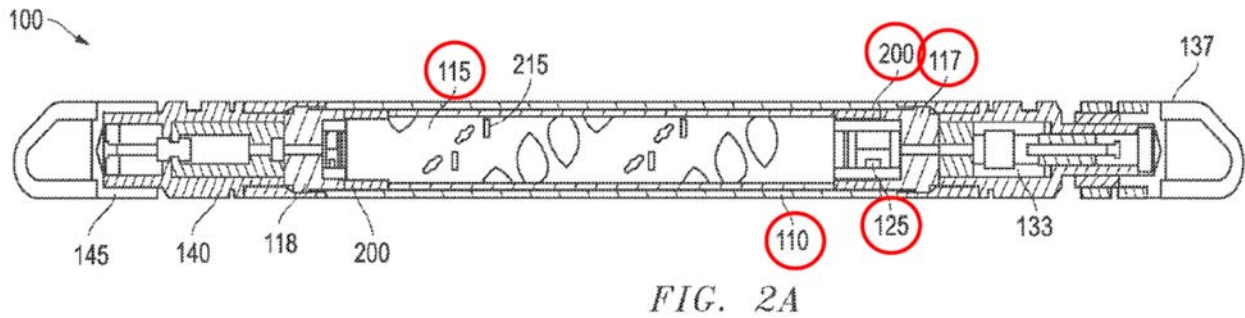


FIG. 2A

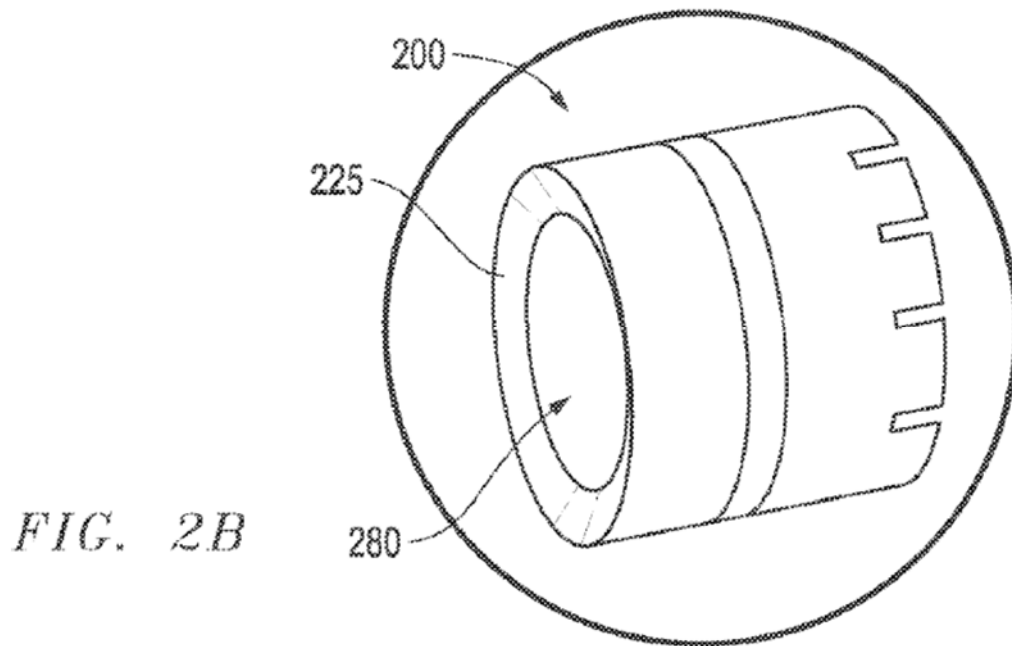
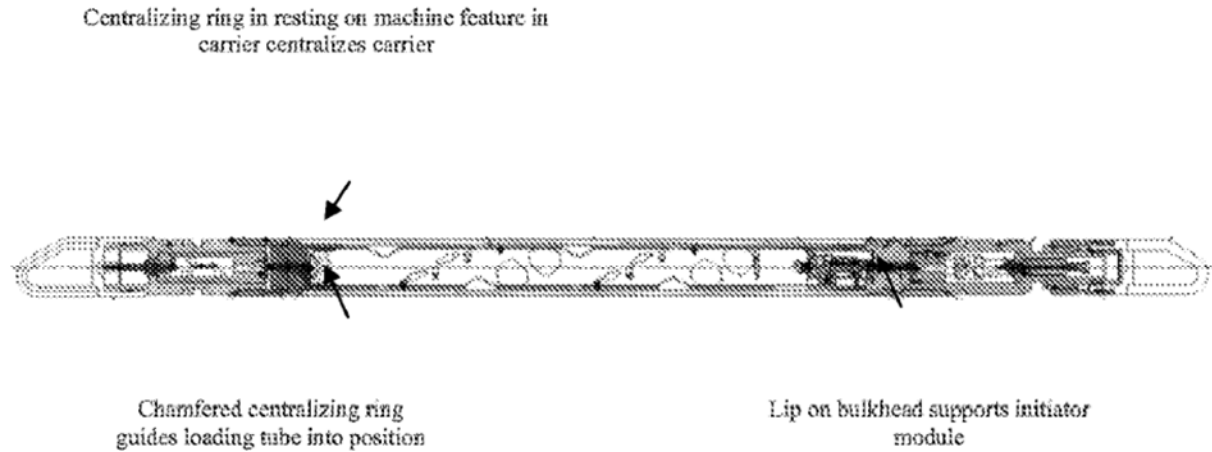
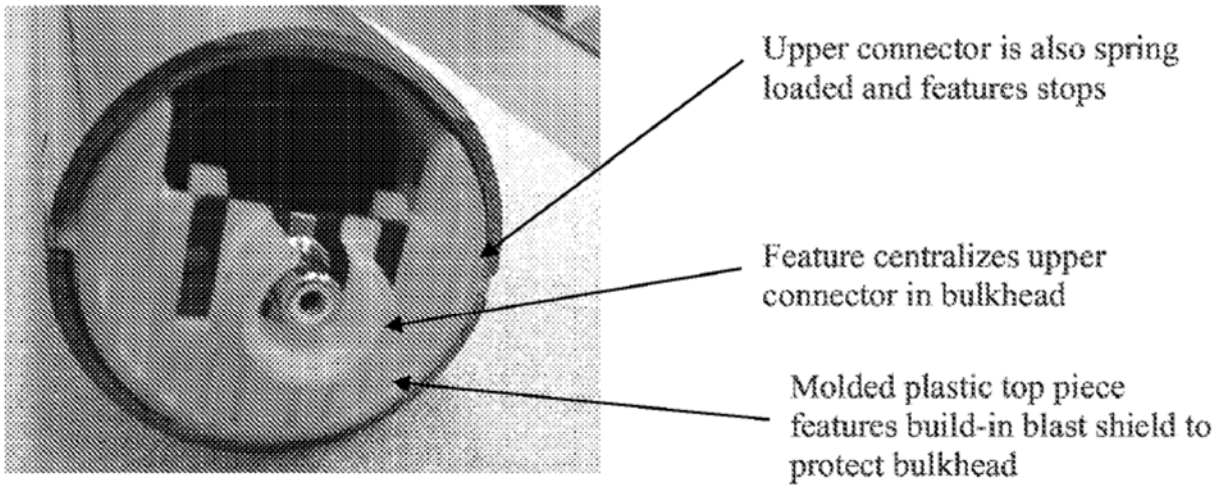


FIG. 2B



**Fig. 1: Fractal Assembly**

Harrigan also teaches a shock absorbing mount or connector 400 and a coupling 440 that receive the initiator in the charge holder. (Ex. 1012, ¶¶ 0039-41; Ex. 1028, pp. 1, 3-5, 7; Ex. 1007, Parrott, ¶ 136.)



**Fig. 6: Loading Tube End (Top)**

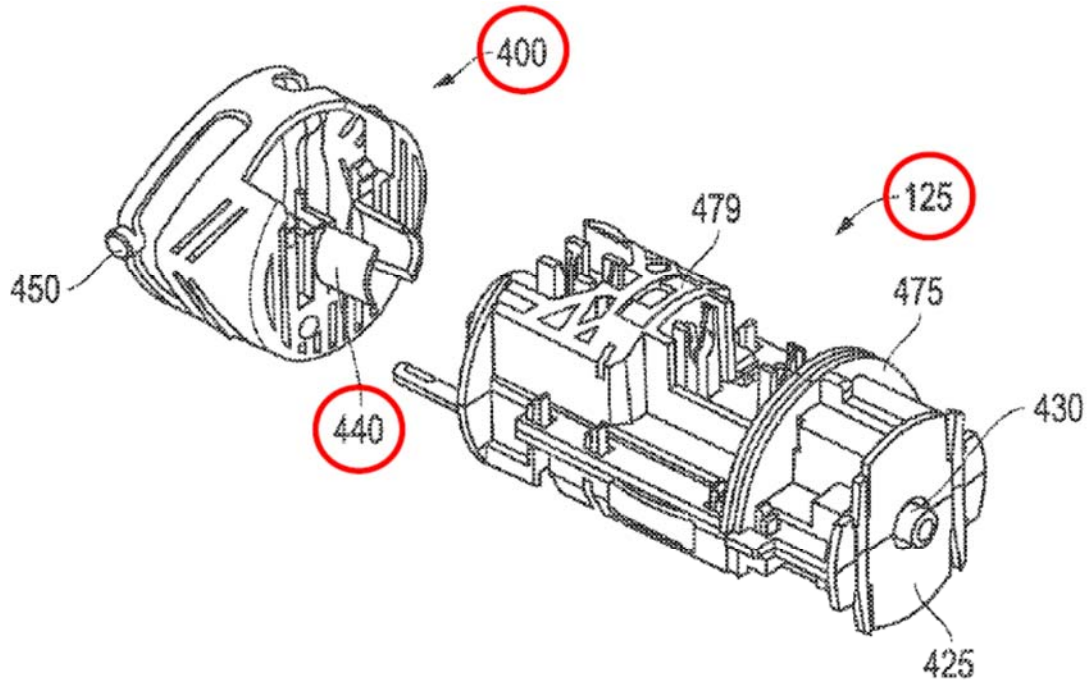


FIG. 4A

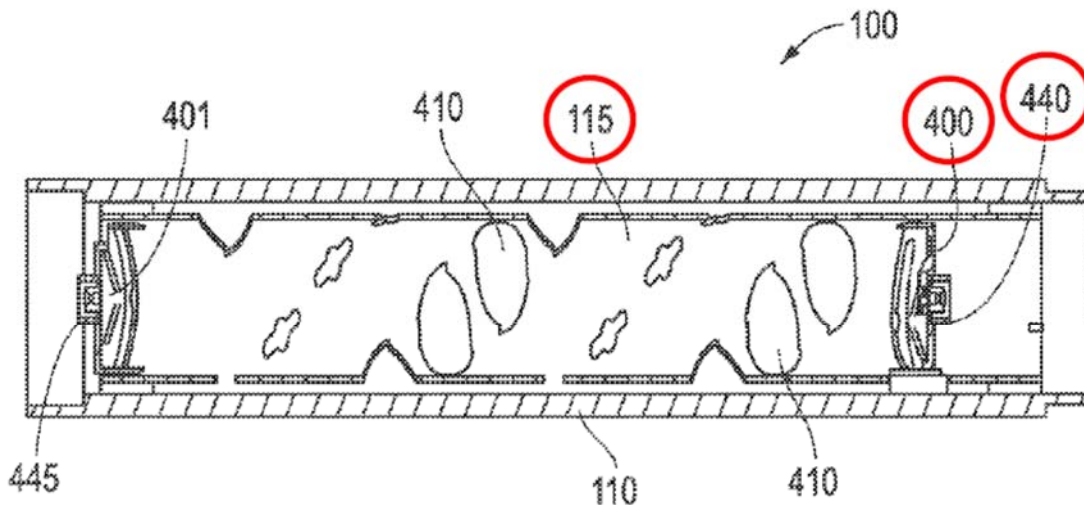


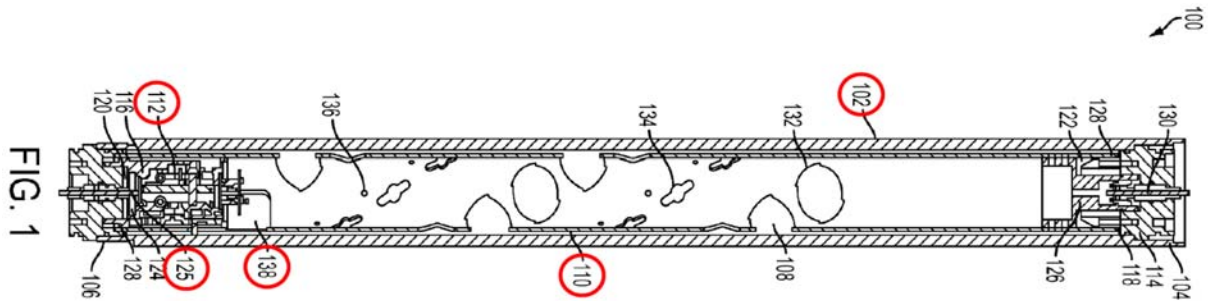
FIG. 4B

Each of the end of loading tube 115, centralizing rings 200, mount/connector 400, coupling 440, and bulkheads includes an opening for receiving at least a portion

of the initiator and coupling it to a detonating cord, teaching the claimed top connector. (Ex. 1012, FIGS. 2A-B, 3A, 4A-B; Ex. 1007, Parrott, ¶¶ 137-38.)

**f) Rogman teaches a top connector**

Rogman teaches a lower connector assembly 125 retaining an initiator assembly 112, 312, 313 in the carrier and coupled to detonator cord. (Ex. 1014, ¶¶ 0015, 0021, 0026-27, 0029, FIGS. 1-3; Ex. 1020, pp. 1-4, 6-8; Ex. 1007, Parrott, ¶¶ 140-43.)



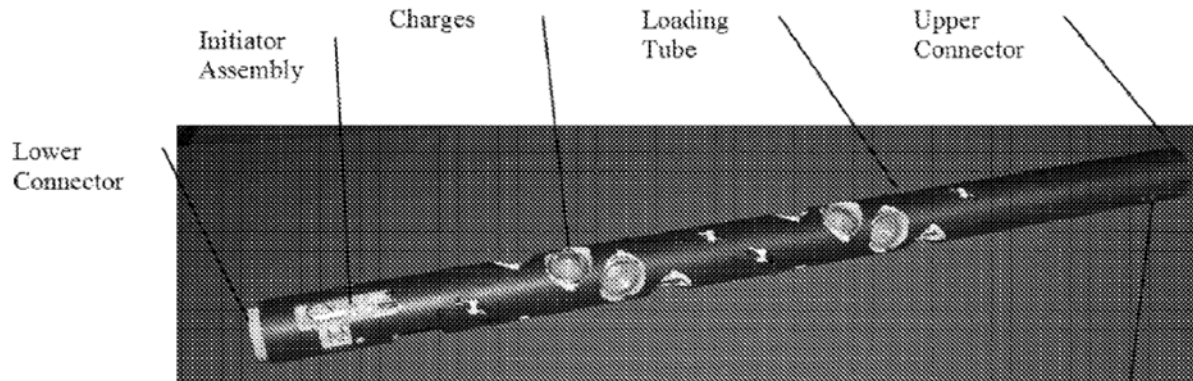


Fig. 2: Fully assembled Steel Loading Tube

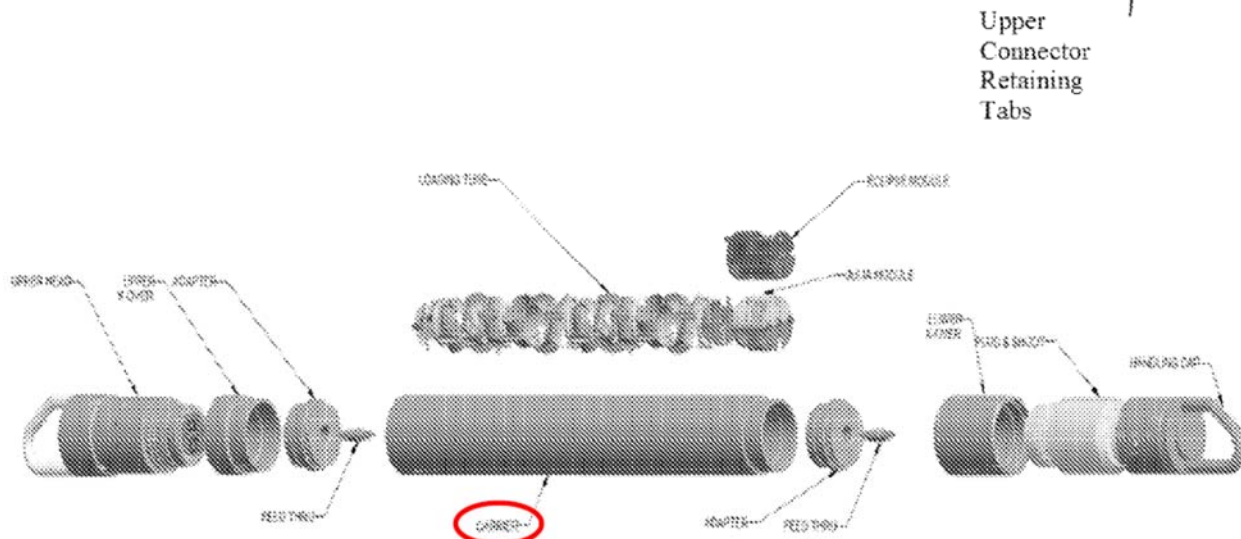


Fig. 3: Overview of the Gun system (shown with previous plastic loading tube design)

Each of the end of loading tube 110 and the lower connector assembly 125 is taught by Rogman as including an opening for receiving at least a portion of the initiator. *Id.*

The end of loading tube 110 and the lower connector assembly 125 each teach the claimed top connector. (*Id.* at 144.)

**g) EWAPS teaches a top connector**

EWAPS teaches a detonator in a housing adjacent to one end of a charge holder inserted into a carrier, teaching the claimed top connector. (Ex. 1013, pp. 0009-11; Ex. 1007, Parrott, ¶¶ 145-48.)

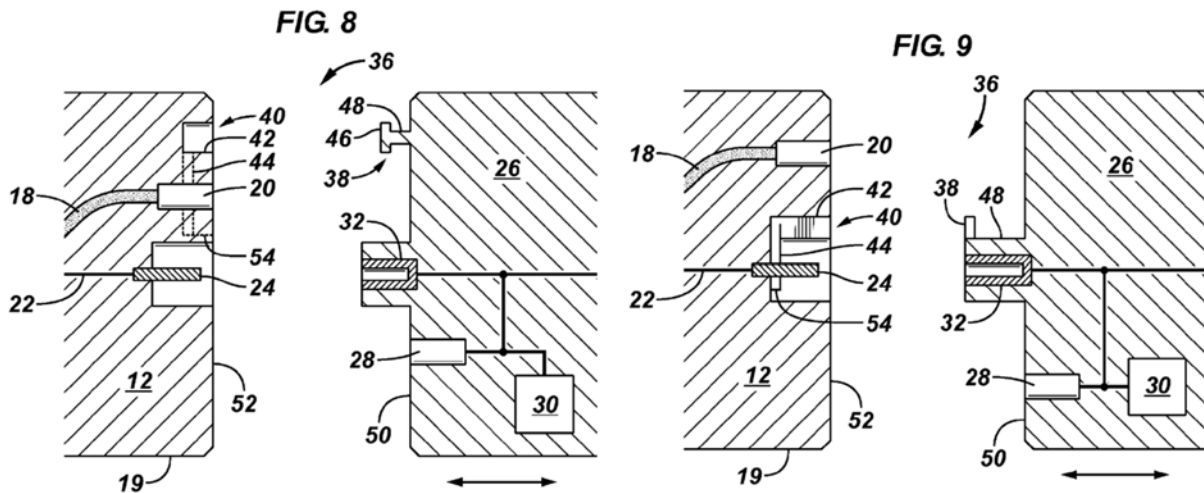
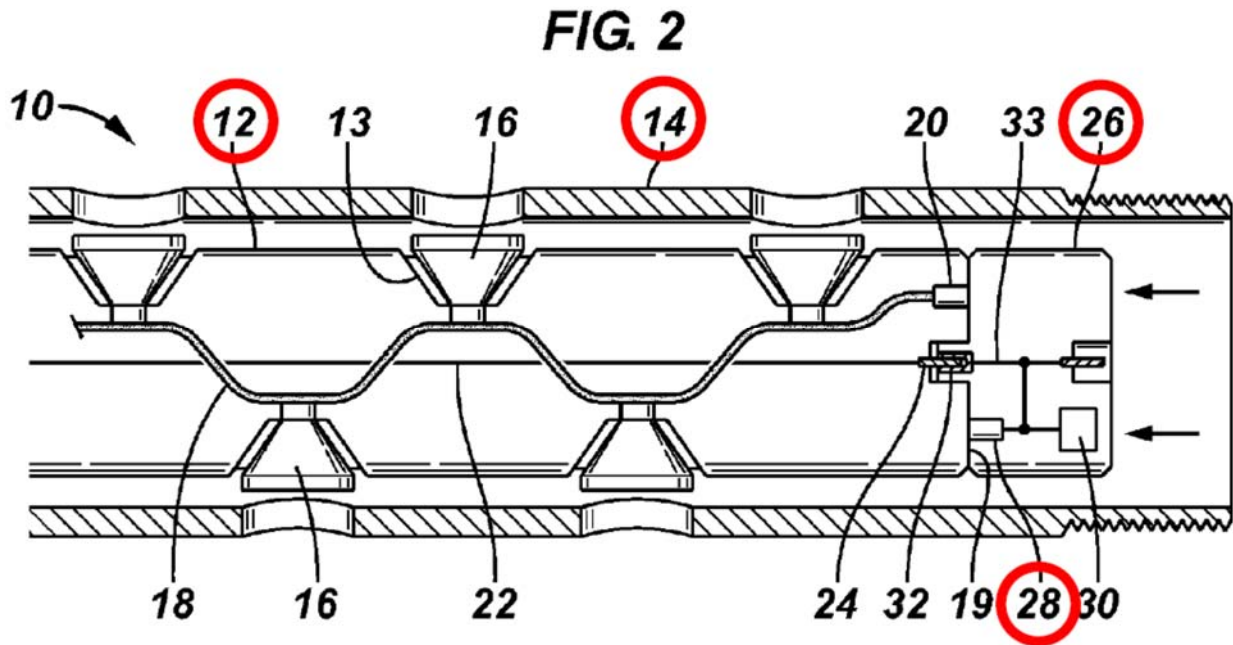


**h) Black teaches a top connector**

Black teaches that end of loading tube 12 includes openings 40, 54, etc. for receiving at least a portion of arming device 26, inside a carrier, teaching the claimed

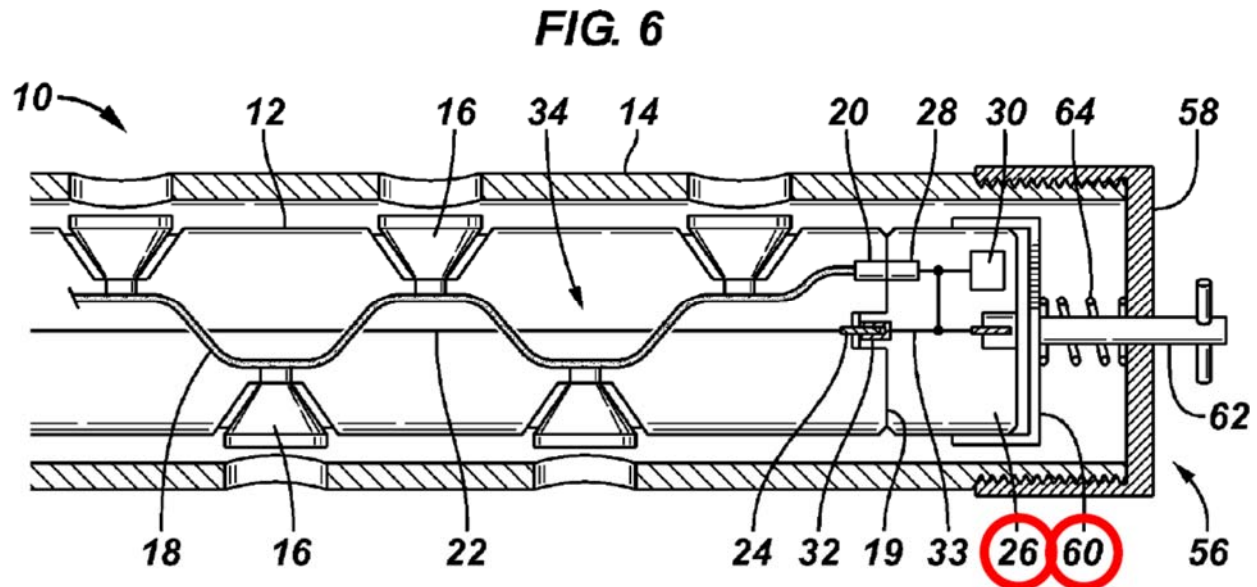


top connector. (Ex. 1002, ¶¶ 0023-24, 0026, 0031-32, 0036, FIGS. 1, 2, 4, 6-10; Ex. 1007, Parrott, ¶¶ 149-52.)

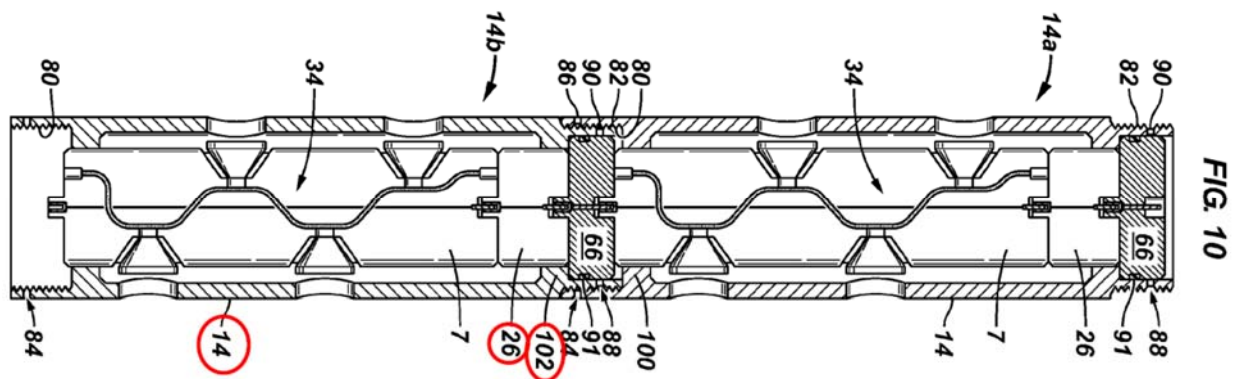


The body of arming device 26 teaches the claimed top connector because it holds detonator 28 adjacent to the charge holder in the carrier. (Ex. 1002, ¶¶ 0023-24, 0026, 0036 FIGS. 1, 2, 4, 6; Ex. 1007, Parrott, ¶ 153.)

Support device 60 also holds the arming device 26 adjacent to the loading tube, teaching the claimed top connector. (Ex. 1002, ¶ 0033, FIG. 6; Ex. 1007, Parrott, ¶ 153.)



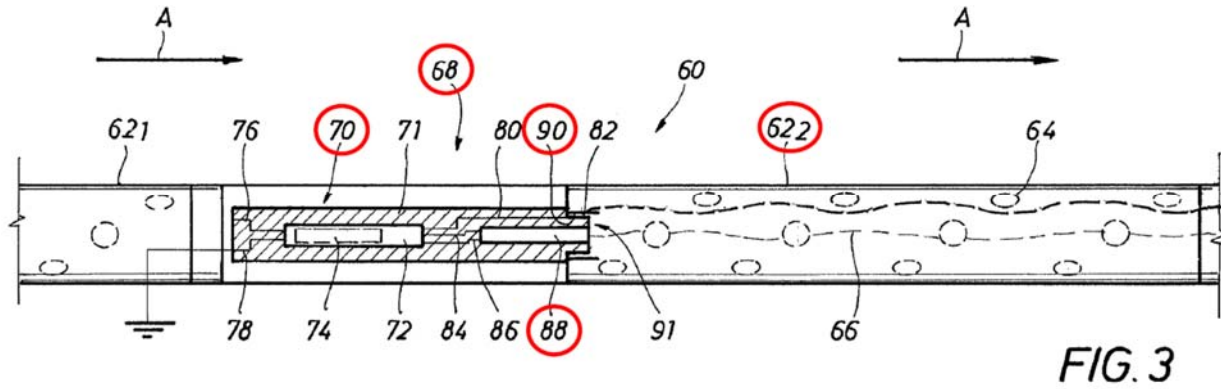
Black's shoulders 102 that hold arming device 26 adjacent to the loading tube, also teach the claimed top connector. (Ex. 1002, FIG. 10; Ex. 1007, Parrott, ¶ 152.)



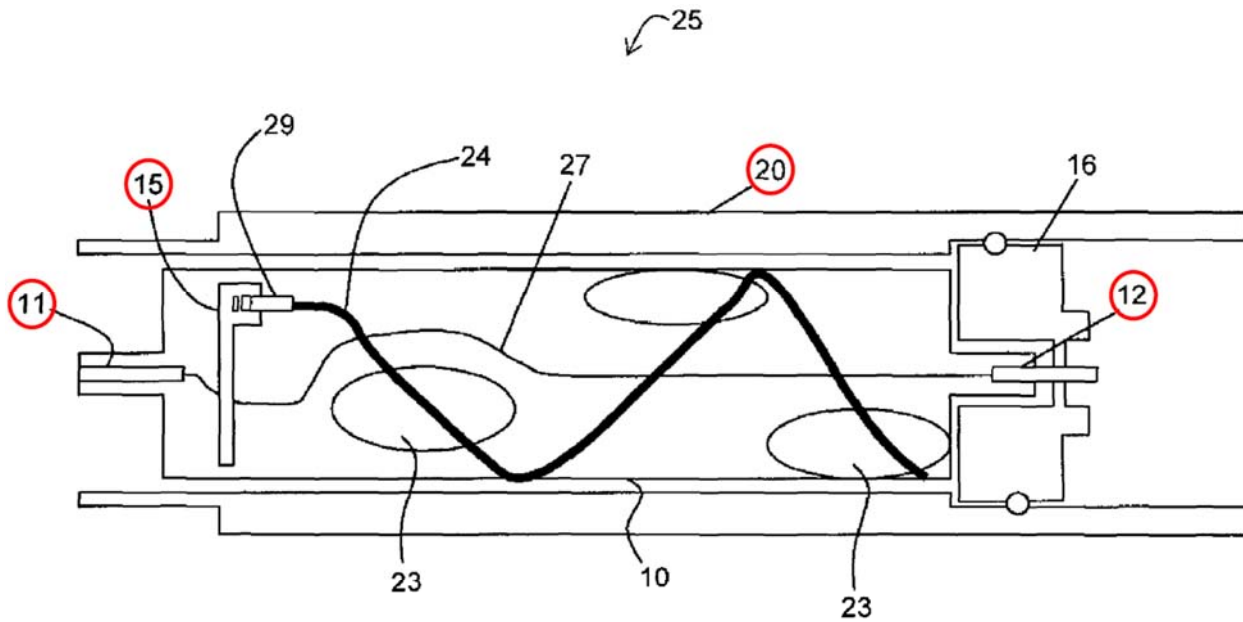
**i) Lanclos teaches a top connector**

Lanclos' cartridge assembly 70 inside a cartridge sub 68, each of which hold a detonator and are in a carrier adjacent to a charge holder, teaching the claimed top

connector. (Ex. 1015, 4:61-5:23, 7:12-16, FIGS. 2A-D, 3; Ex. 1007, Parrott, ¶¶ 155-60.)



**j) Goodman teaches a top connector**



A POSITA would understand that the devices taught by Goodman must inherently have a component with the initiator 15, 45, 47 at least partially within it to function. (Ex. 1018, ¶¶ 0005-7, 0018-20, 0023-24, FIGS. 1-5; Ex. 1007, Parrott, ¶¶ 162-163.) Such a component would be necessary to hold the detonator in place relative to the detonating cord and to prevent damage during transport and use. (Ex. 1007, Parrott, ¶ 163.) Such a component would necessarily be inserted into the carrier 20 and the detonator necessarily inserted into that component adjacent to a charge holder. *Id.* Goodman inherently teaches the claimed top connector. (*Id.* at 64.)

**k) Obviousness of a top connector**

It would be obvious for a POSITA to modify the teachings of Schacherer, Black, Lanclos, Rogman, or EWAPS to include a top connector adapting a detonator to fit the inner surface of varying sized perforating guns, as Harrigan teaches for centralizer rings 200 and as is well known as common knowledge in the art. This would be the predictable application of known methods without any unexpected results, simple substitution of the known adapters, the use of known adapters for their understood benefits, and obvious to try as selecting from the infinite number of identifiable and options for assembling perforating guns that are available with a reasonable expectation of success. (Ex. 1007, ¶¶ 134, 142, 148, 154, 160, and 167.)

**5. Detonator Entirely Within Gun Carrier**

Claim 1	Claim 14
a detonator contained entirely within the outer gun carrier,	wherein inserting the detonator into the outer gun carrier includes pushing the detonator into the outer gun carrier.

**a) Indefiniteness, lack of written description and construction of a detonator within the carrier**

The plain and ordinary meaning of “A detonator contained entirely within the outer gun carrier” is “a detonator contained entirely within the hollow interior of the outer gun carrier.” (Ex. 1007, Parrott, ¶ 169.)

Claim 13 does not include inserting a detonator into the outer gun carrier for Claim 14 to modify. Claim 14 could be interpreted as further limiting the “inserting a detonator into the top connector” limitation of Claim 13, requiring that step (b) of Claim 13 must happen before step (c), or adding a new step of “inserting a detonator into the outer gun carrier”. (Ex. 1007, Parrott, ¶ 170.) Because each of these interpretations is equally valid, Claim 14 is indefinite. *Id.*

Although the meaning of Claim 14 is unclear, a POSITA’s most likely understanding or best guess would be as an additional step of “pushing the detonator at least partly into the hollow interior of the outer gun carrier.” *Id.* A POSITA would recognize that inserting a detonator into an outer gun carrier necessarily requires pushing the detonator into the gun carrier. *Id.*

**b) The Patent acknowledges a detonator within the carrier as prior art**

The background section of the Patent states “In order to initiate the perforators, there is a detonating cord leading through the gun carrier that is coupled to a detonator.” (Ex. 1001, 1:40-42.) This appears to state that the prior art taught detonators within gun carriers. (Ex. 1007, Parrott, ¶ 173.)

**c) Common knowledge includes a detonator within the carrier**

It is well known in the art that a hollow carrier perforating gun often includes a detonator pushed entirely within the outer carrier for detonating that perforating gun, rendering such an obvious modification of any reference. (Ex. 1007, Parrott, ¶¶ 177-79.) The ubiquity of detonators within carriers is shown by the teachings of additional references. (Ex. 1007, Parrott, ¶¶ 80, 191, 200-202, 205, 207, 208.) This common knowledge is supported by the Patent failing to discuss the detonator being “entirely within” the gun carrier or pushed in, or any benefits provided by those limitations. (Ex. 1007, Parrott, ¶¶ 177-79.)

**d) Schacherer teaches a detonator within the carrier**

Schacherer’s detonator, including electrical contacts, is entirely within the combination of housings 26 and 30, teaching pushing a detonator entirely within the carrier as claimed. (Ex. 1004, 2:25–40, 3:30–43, 3:66-4:4, 5:37-42, 6:9-12, 8:4–14, FIGS. 1, 2, 4, 5, 8; Ex. 1007, Parrott, ¶¶ 60, 181-186.)

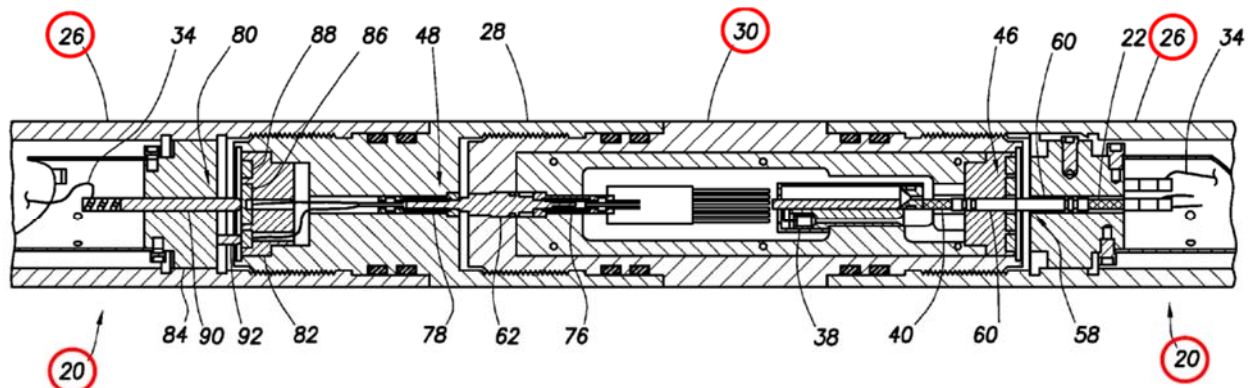
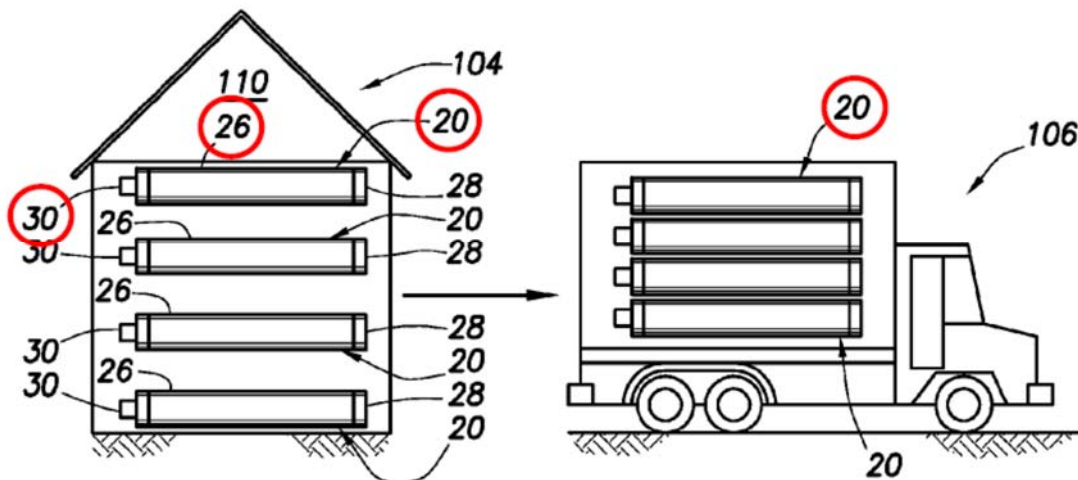


FIG. 5



The PTAB has already held that Schacherer's outer housing 26 and connector 30 act as a single housing containing a detonator. (Ex. 1010, Final Written Decision, p. 28.)

**e) Harrigan teaches a detonator within the carrier**

Harrigan and its provisional teach an initiator assembly module "forcibly pushed" entirely into carrier 110. (Ex. 1012, ¶¶ 0033, 0040, FIGS. 1A, 2A, 4B; Ex. 1028, pp. 3-5; Ex. 1007, Parrott, ¶¶ 187-90.)

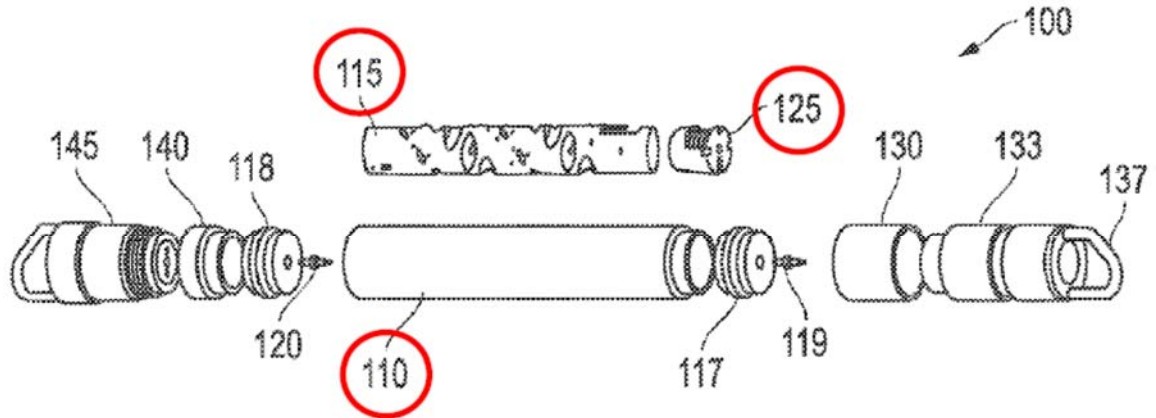


FIG. 1A

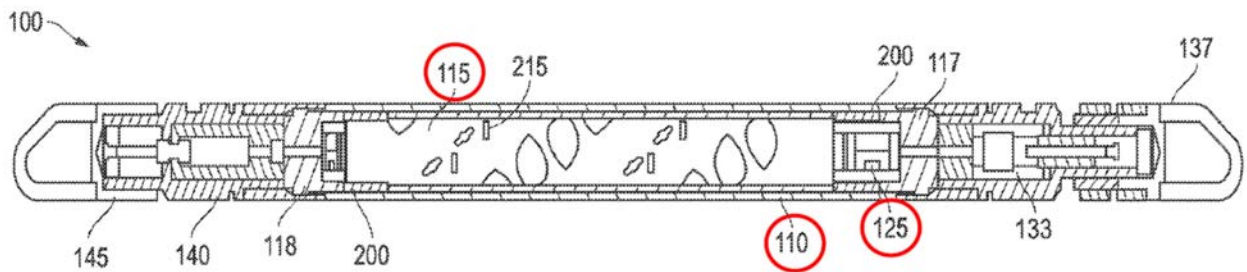


FIG. 2A

**f) Rogman teaches a detonator within the carrier**

Rogman teaches an initiator assembly 112, 312 inserted/pushed entirely into the carrier 102, 302 as claimed. (Ex. 1014, ¶¶ 0015, 0021, 0026-27, FIGS. 1-3; Ex. 1020, pp. 1-4; Ex. 1007, Parrott, ¶¶ 192-95.)

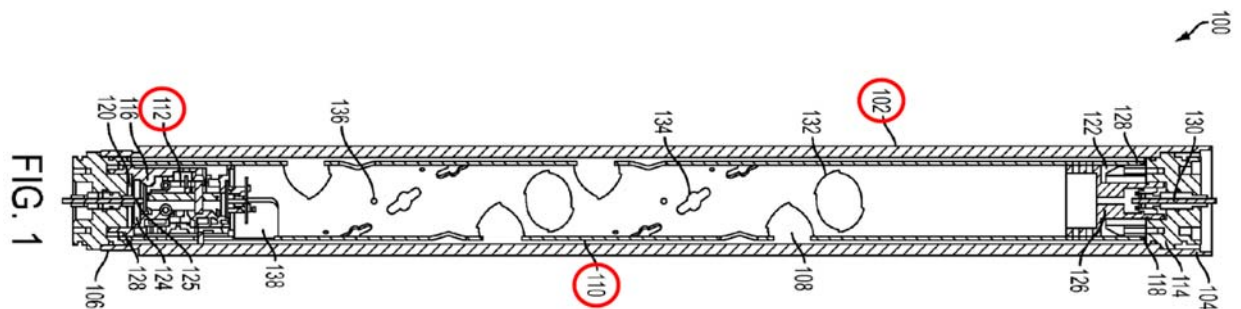


FIG. 1



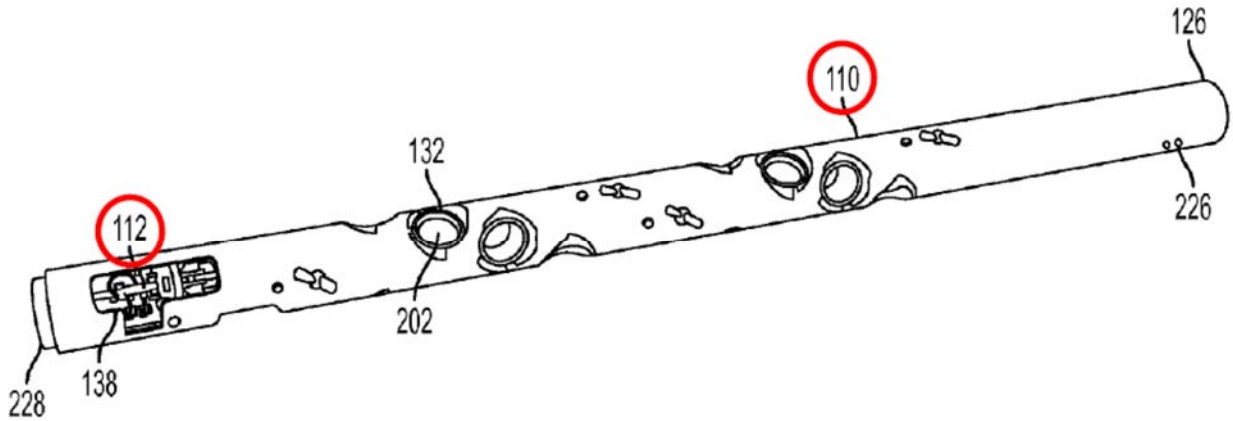


FIG. 2

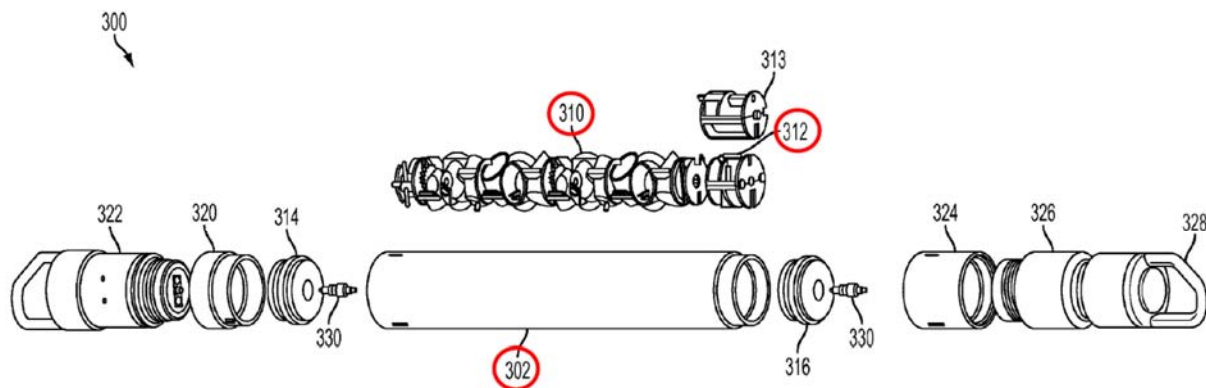
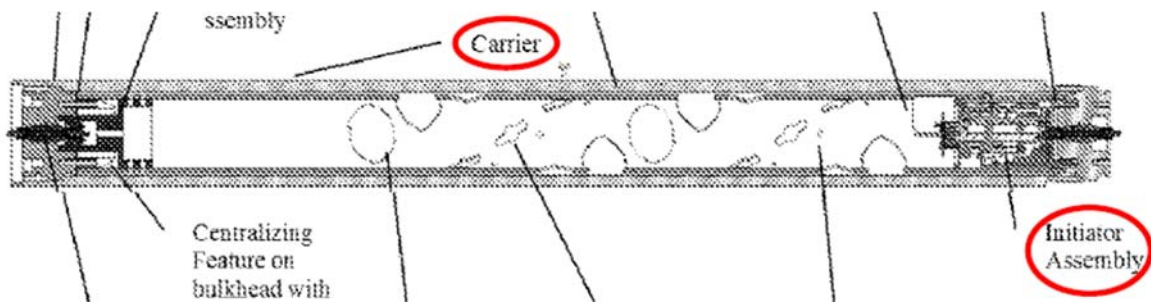
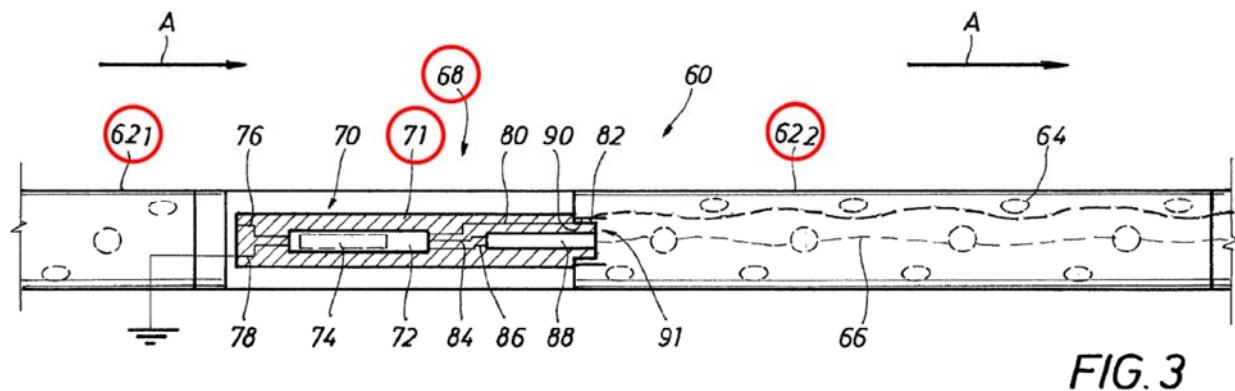


FIG. 3



**g) Lanclos teaches a detonator within the carrier**

Lanclos teaches cartridge assembly pushed entirely within cartridge sub 68, which is part of a carrier as claimed. (Ex. 1015, 4:61-5:1, 7:12-16, FIG. 3; Ex. 1007, Parrott, ¶¶ 196-199.)



**h) Goodman teaches a detonator within the carrier**

Goodman teaches a detonator/initiator 15, 45, and 47 pushed entirely within a gun carrier 20, 48 as claimed. (Ex. 1018, ¶¶ 0005-7, 0018-20, 0023-24, FIGS. 1-5; Ex. 1007, Parrott, ¶¶ 203-204.)

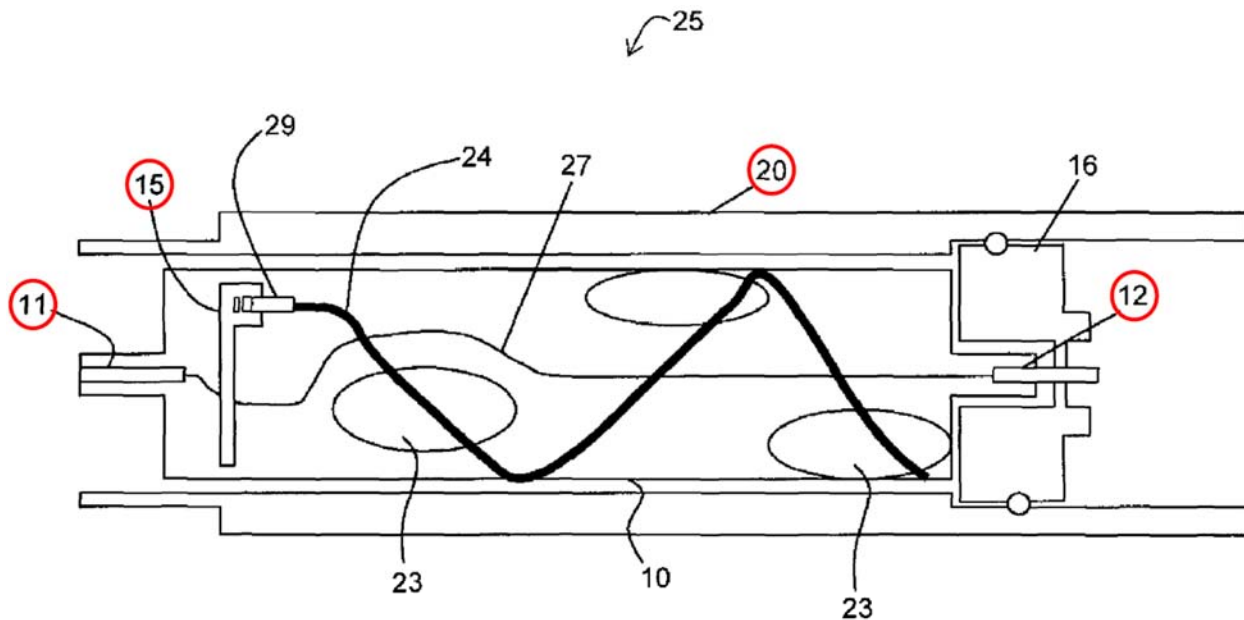


FIG. 2

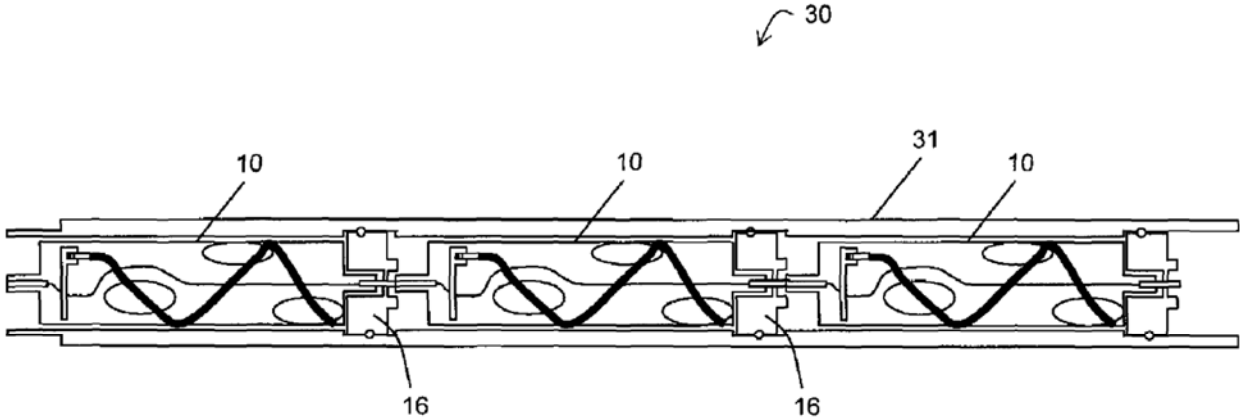


FIG. 3

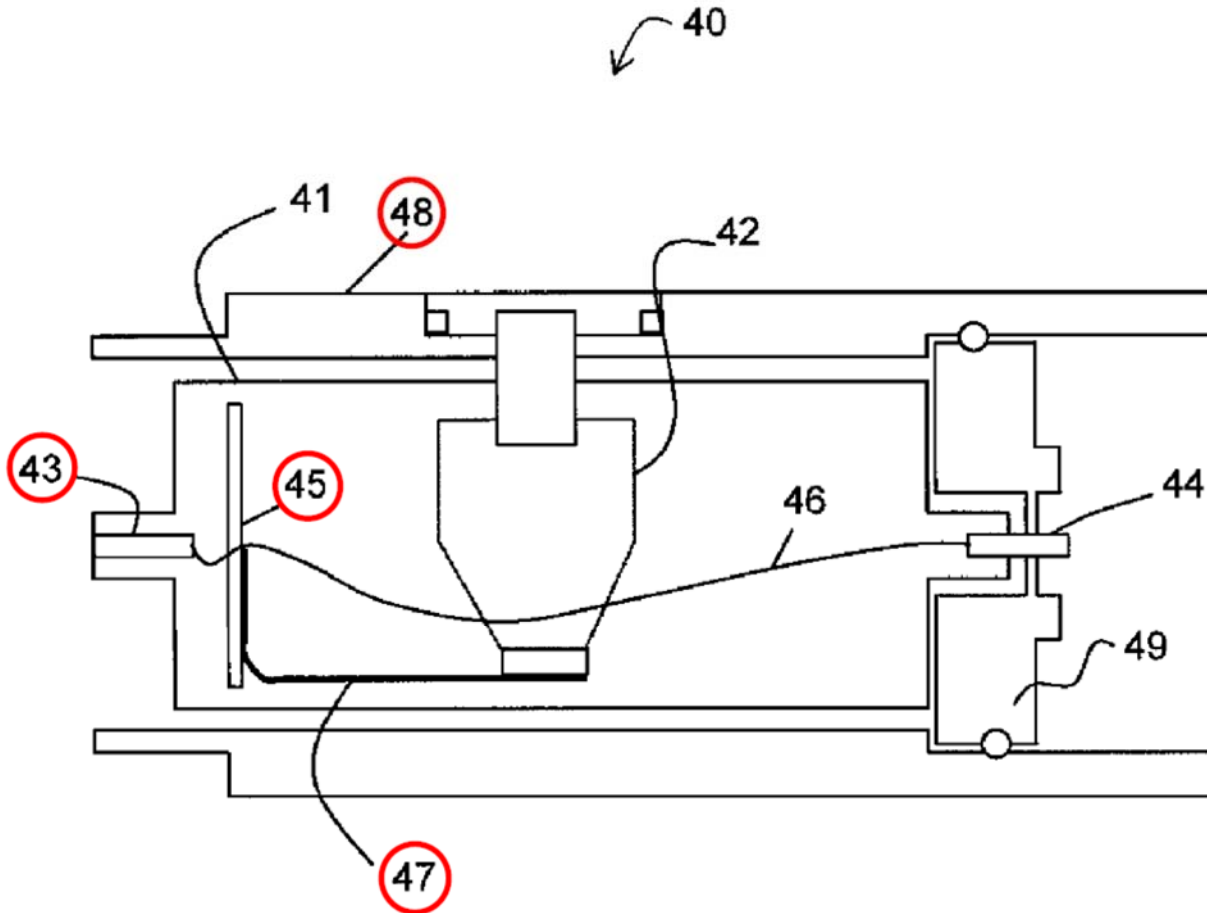
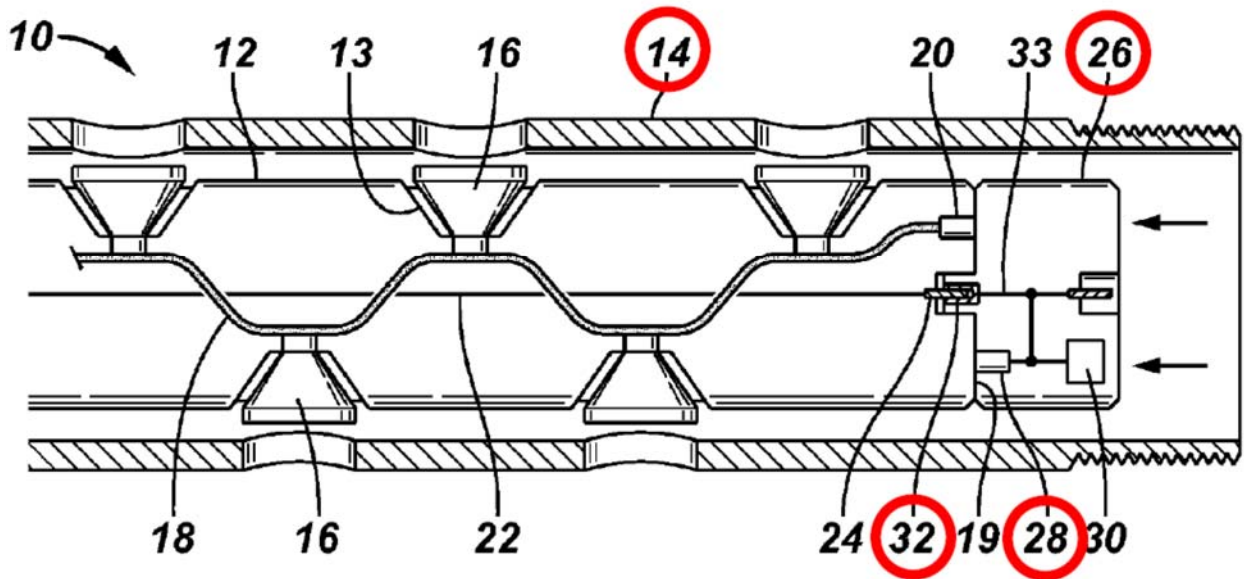


FIG. 4

**i) Black teaches a detonator within the carrier**

Black teaches an arming device 26 including a detonator 28 and an electrical connector 32 pushed entirely within a gun carrier 14 as claimed. (Ex. 1002, ¶¶ 0007-8, 0023-24, FIGS. 1-2, 4, 6-7, 10; Ex. 1007, Parrott, ¶ 206.)

**FIG. 2**



**j) EWAPS teaches a detonator within the carrier**

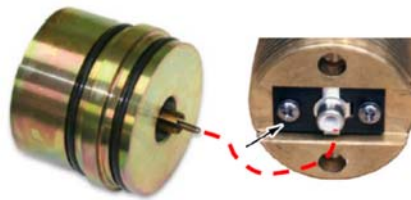
EWAPS teaches a detonator pushed entirely inside a carrier as claimed. (Ex. 1013, pp. 5, 9, 10; Ex. 1007, Parrott, ¶¶ 209-210.)



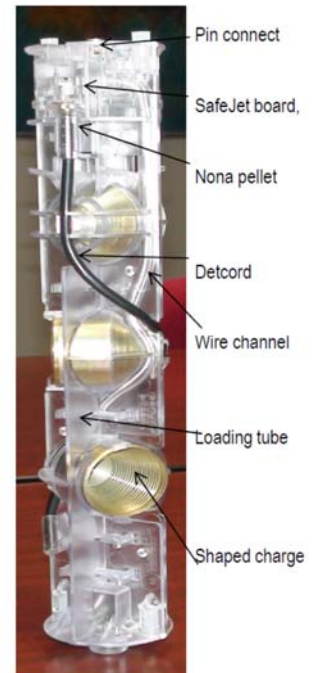
Pre-assembled with wiring and detonator cord - no booster, no crimping

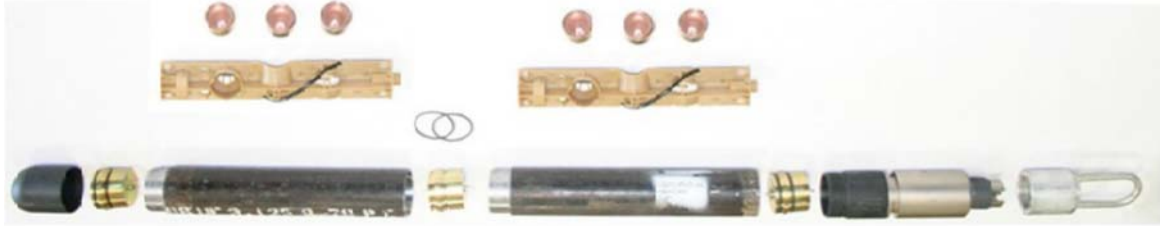


SafeJet board  
(ASFS+ + Secure\*  
Technology)



Disposable bulkheads





**k) Obviousness of a detonator within the carrier**

If the carrier were interpreted narrowly, A POSITA implementing Schacherer or Lanclos would be motivated to combine it with the detonator entirely within the carrier and related housings taught by common knowledge, Black, Rogman, Harrigan, EWAPS, and/or Goodman to achieve increased wellsite efficiency and reduced manufacturing complexity and cost. (Ex. 1007, ¶¶ 178-80.)

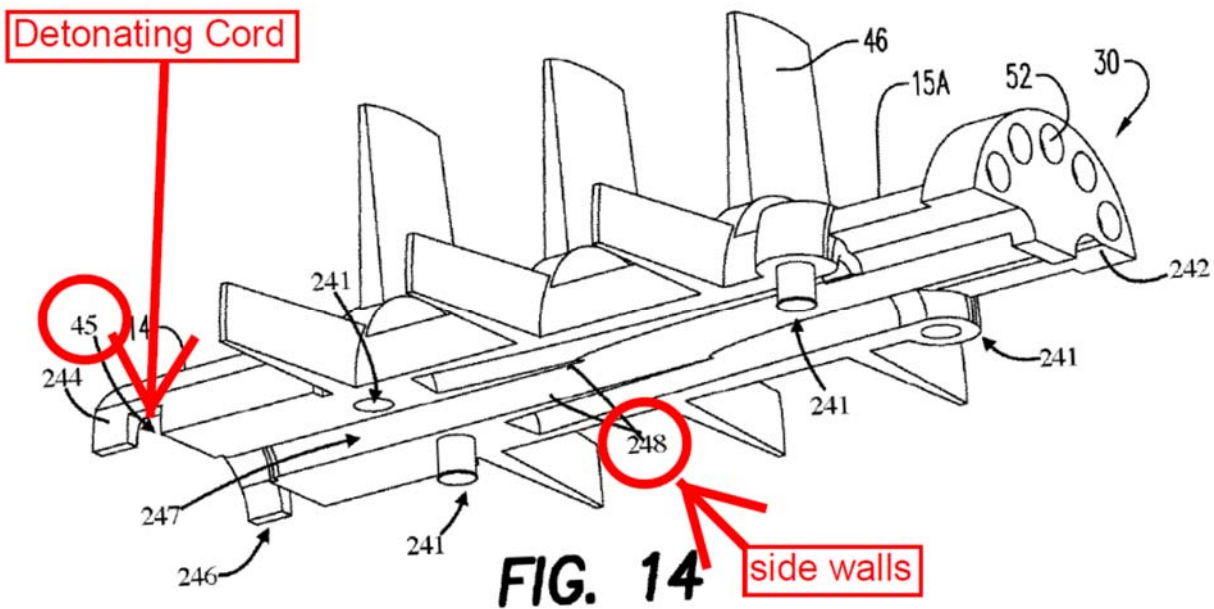
**6. Energetically Coupling**

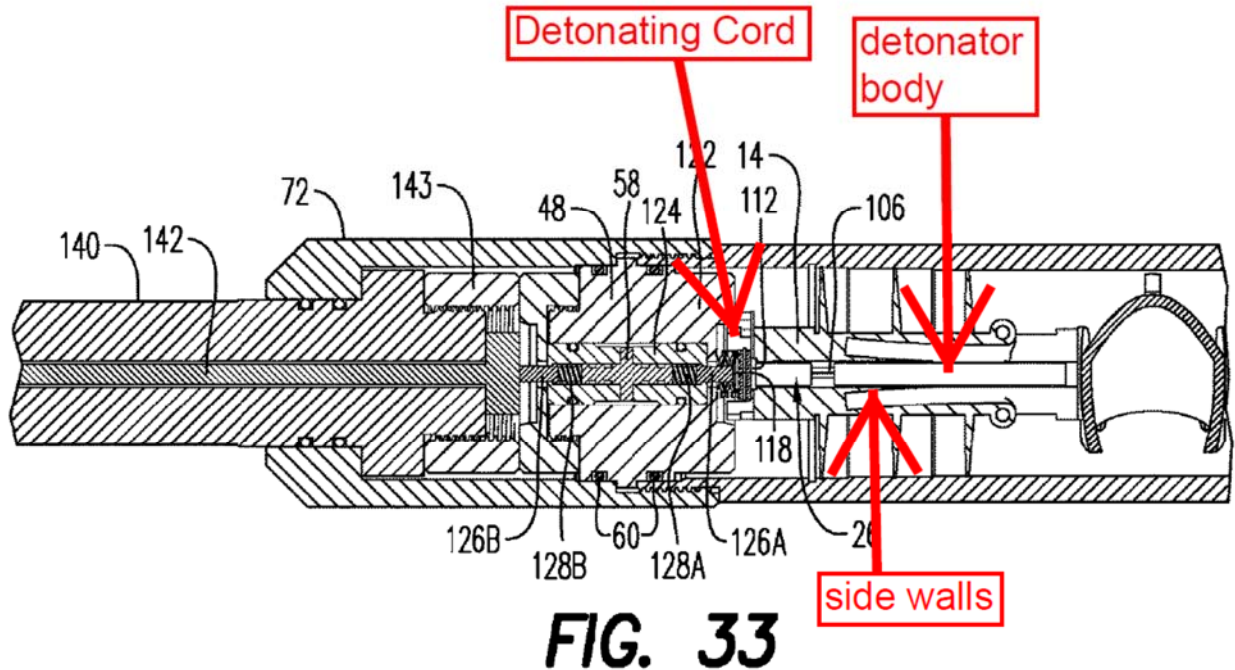
Claim 13	Claim 10
(e) energetically coupling the detonating cord to the detonator	The modular detonator of claim 9, further comprising a detonating cord connecting portion, wherein the detonating cord connecting portion is sized to retain a detonating cord and positioned to energetically couple the detonating cord to the detonator.

**a) Lack of written description, and construction of energetically coupling**

The plain and ordinary meaning of the Claim 13 (e) limitation is placing a detonator sufficiently proximate to a detonating cord such that when the detonator is initiated the detonation will be transferred to the detonating cord. (Ex. 1007, Parrott, ¶ 493.)

The only structure provided for energetic coupling is “side walls 248.” (Ex. 1001, 7:39-42; Ex. 1007, Parrott, ¶ 495.) However, the detonating cord is described as in blind hole 45, on the opposite side of the electrical connections of detonator head 100 from side walls 248 and detonator body 102, where it would not be energetically coupled to the detonator. (Ex. 1001, 8:46-49; Ex. 1007, Parrott, ¶ 495.) Energetically coupling the detonator and detonating cord requires placing the detonating cord proximate to the explosive, not electrical connections. (Ex. 1007, Parrott, ¶ 495.)





Therefore, Claim 13 is invalid for lack of written description. (Ex. 1007, Parrott, ¶ 497.)

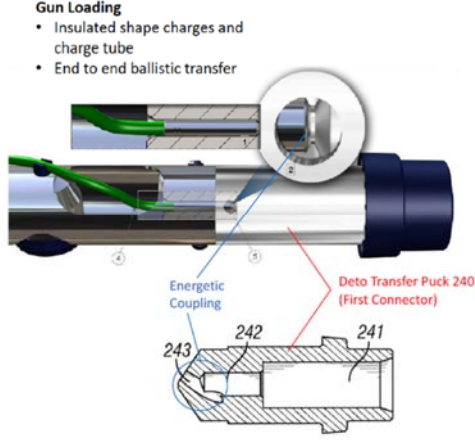
**b) Indefiniteness, lack of written description, and construction of Claim 10**

The Patent provides no discussion of a detonator with a detonating cord connecting portion, but rather describes only detonators that do not have any way to retain a detonating cord, lacking written description for Claim 10. (Ex. 1001, FIGS. 27-31; Ex. 1007, Parrott, ¶¶ 498-501.)

Demonstrating the ambiguity of this claim language caused by the lack of description, Patent Owner has alleged infringement of Claim 10 by a transfer puck



that Patent Owner alleges is the “first connector,” not a detonator. (Ex. 1006, p. 0031; Ex. 1007, Parrott, ¶ 502.)

US 10,472,938 Claim 10	Defendant’s H-1® Perforating Gun System
<p><b>10.</b> The modular detonator of claim 9, further comprising a detonating cord connecting portion, wherein the detonating cord connecting portion is sized to retain a detonating cord and positioned to energetically couple the detonating cord to the detonator.</p>	<p>The deto transfer puck of the H-1 gun system has a detonating cord connecting portion.</p>  <p><b>FIG. 20D</b></p>

This ambiguity renders Claim 10 indefinite. (Ex. 1007, Parrott, ¶ 503.)

A POSITA’s best guess at the meaning of Claim 10 would be a detonator that retains a detonating cord in one end of the detonator and holds it in position such that detonation is transferable from the detonator to the detonating cord. (*Id.* at 504.)

**c) The Background acknowledges energetically coupling as prior art**

The Patent describes prior art perforating guns as having “a detonating cord ... coupled to a detonator,” as claimed. (Ex. 1001, 1:40-42, 1:49-53; Ex. 1007, Parrott, ¶ 505.)

**d) Common knowledge includes energetically coupling**

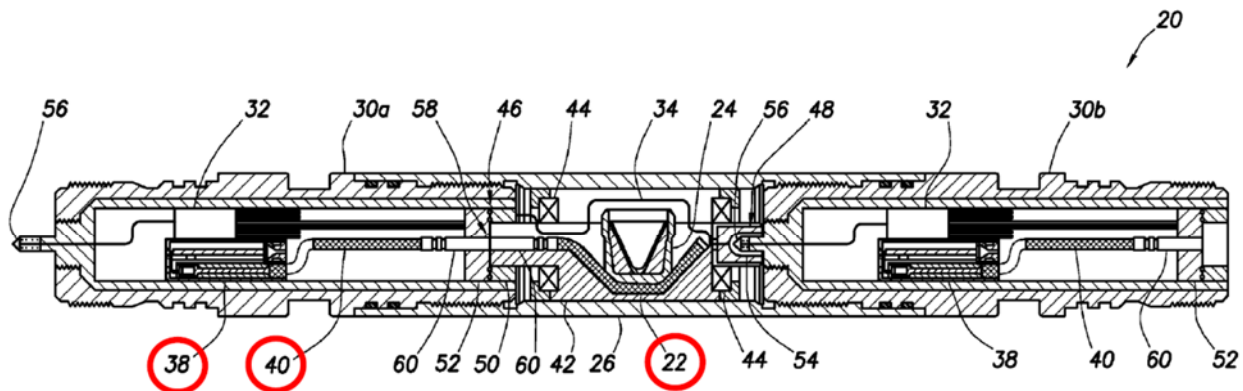
A POSITA's common knowledge would include that a perforating gun includes a detonator energetically coupled to a detonating cord as claimed. (Ex. 1007, Parrott, ¶ 506.)

A POSITA would know that the majority of commercial detonators have a detonating cord connecting portion as claimed. (*Id.* at 507.) The Patent's failure to describe such a detonator supports that it was well known in the art. (*Id.*)

The ubiquity of these features in the art is shown by additional references. (Ex. 1007, Parrott, ¶¶ 528-29, 532-33.)

**e) Schacherer teaches energetically coupling and a detonating cord retaining portion**

Schacherer teaches a detonator 38 with a detonating cord retaining portion holding detonating cord 40, which is energetically coupled to detonating cord 22 as claimed. (Ex. 1004, 3:33-37, FIGS. 2, 4, 5 and 6; Ex. 1007, Parrott, ¶¶ 508-512.)

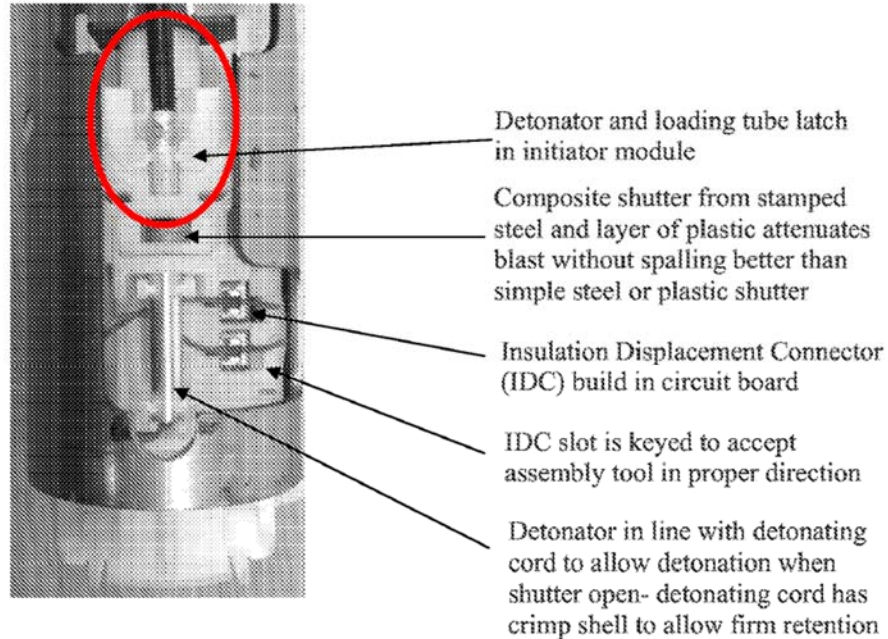


**FIG.2**

**f) Harrigan teaches energetically coupling**

Harrigan teaches the necessity of aligning the detonator to energetically couple it to the detonating cord and a detonating cord retaining portion as claimed.

(Ex. 1012, ¶ 0038; Ex. 1028, p. 5; Ex. 1007, Parrott, ¶ 513.)



**Fig. 4: Loading Tube End (Top)**

**g) Rogman teaches energetically coupling**

Rogman teaches initiator assemblies 112, 312, 313, energetically coupled to detonator cord 404. (Ex. 1014, ¶¶ 0015, 0021, 0026-27, 0029, FIGS. 1-4; Ex. 1020, pp. 1-4, FIGS. 1-5; Ex. 1007, Parrott, ¶ 514.) Rogman teaches the initiator sized to retain a detonating cord. *Id.*

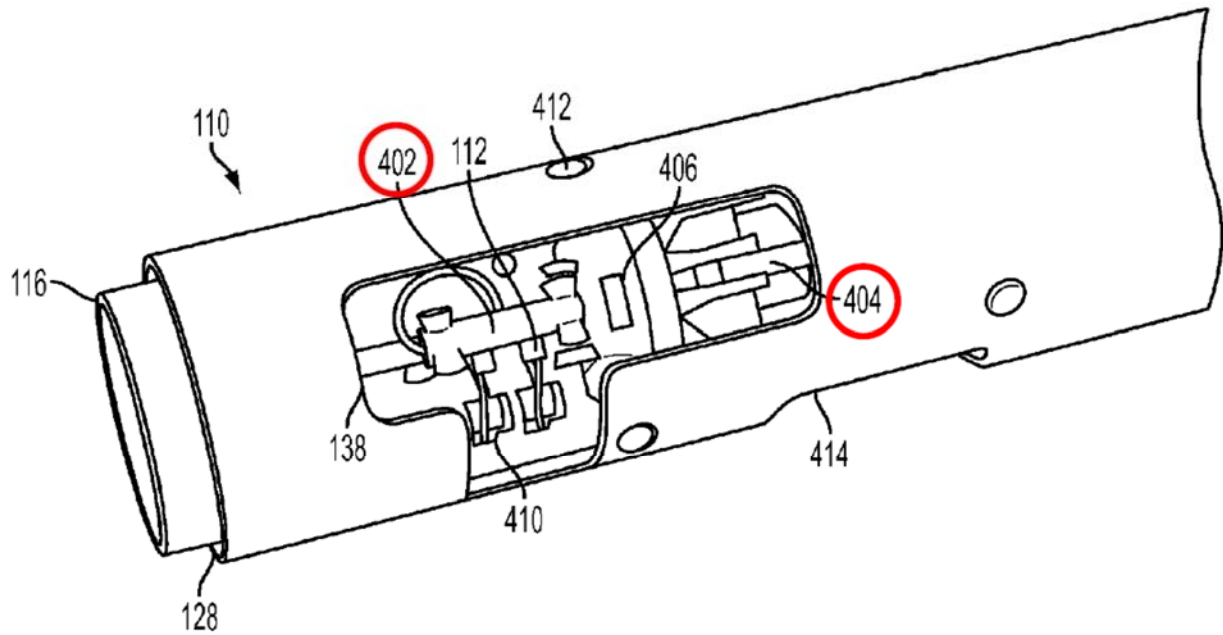
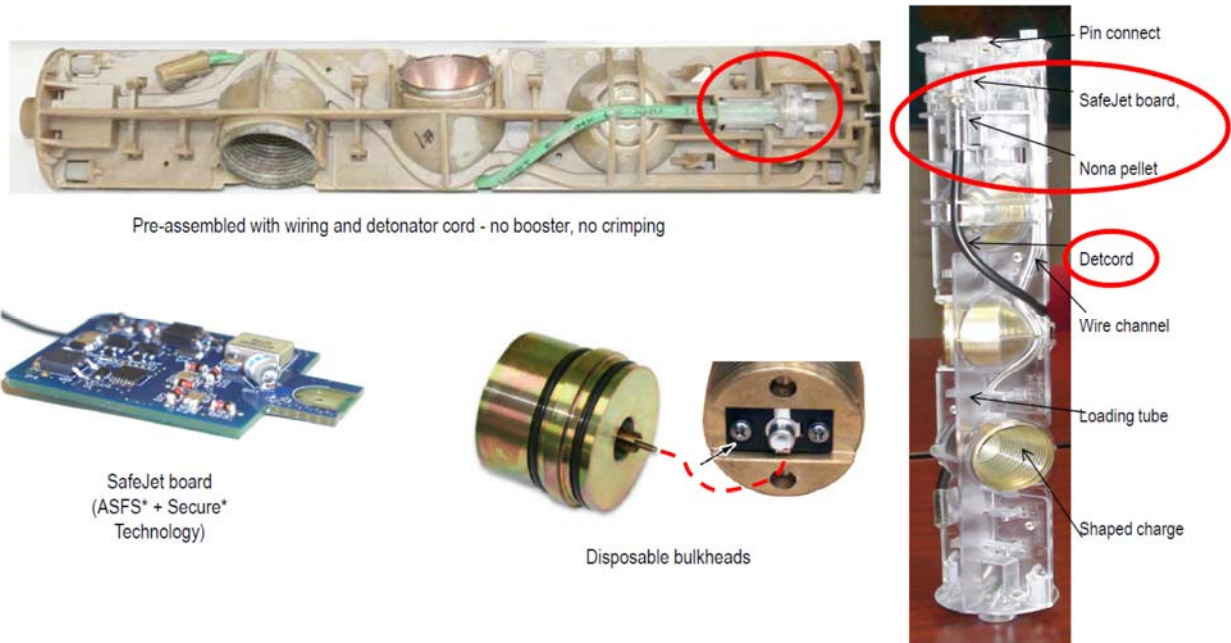


FIG. 4

Rogman teaches the claimed energetically coupling and detonating cord connecting portion. (Ex. 1007, Parrott, ¶¶ 515-16.)

**h) EWAPS teaches energetically coupling**

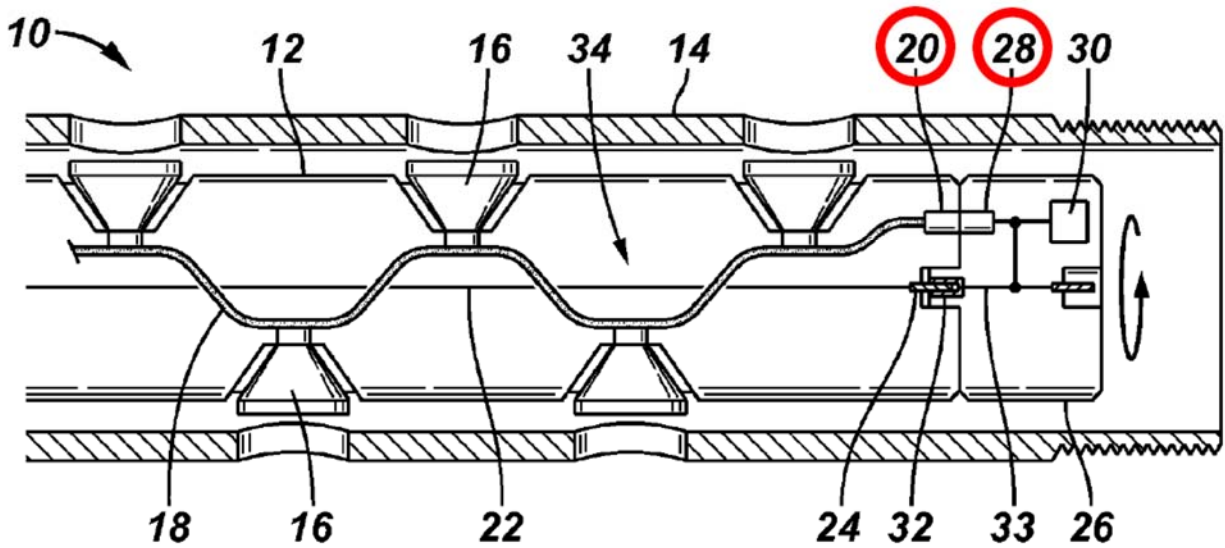
EWAPS teaches the claimed energetically coupling a detonator to a detonating cord and detonator with a detonator cord retaining portion as circled in red below. (Ex. 1013, p. 010; Ex. 1007, Parrott, ¶¶ 517-20.)



**i) Black teaches energetically coupling**

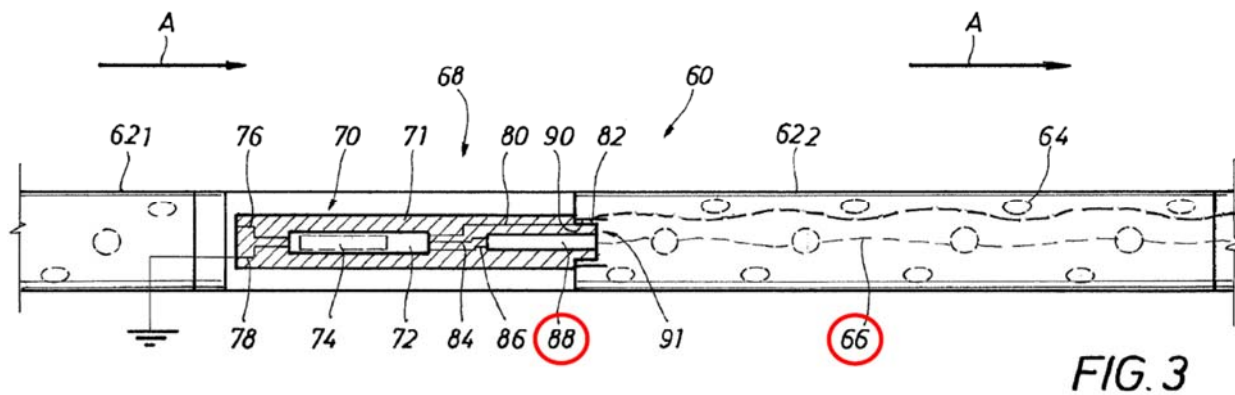
Black teaches energetically coupling the detonating cord 20 to the detonator 28. (Ex. 1002, ¶¶ 0023-24, 0027, 0032, 0034, FIGS. 4, 6, 7; Ex. 1007, Parrott, ¶¶ 521-22.)

**FIG. 4**



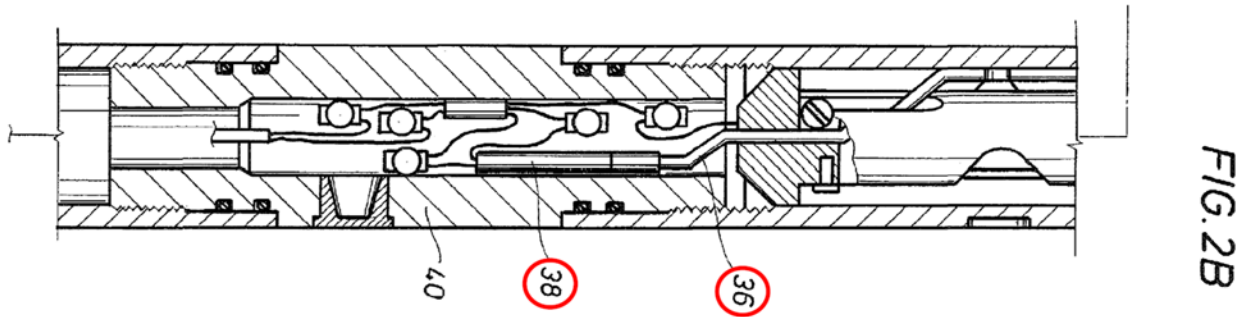
**j) Lanclos teaches energetically coupling**

Lanclos teaches a detonator 88 energetically coupled to a detonating cord 66 as claimed. (Ex. 1015, Abstract, 4:47-52, 5:29-34, FIG. 3; Ex. 1007, Parrott, ¶ 523.)



**FIG. 3**

Lanclos also teaches a detonator 38 receiving the end of detonating cord 36 that could be used in place of detonator 88, teaching the claimed detonating cord retaining portion. (Ex. 1015, 1:64-2:15, FIG. 2B; Ex, 1007, Parrott, ¶¶ 524-27.)



**k) Goodman teaches energetically coupling**

Goodman teaches a detonator/initiator and a detonating cord received in a recess in the initiator, energetically coupling the detonator and detonating cord as claimed. (Ex. 1018, ¶¶ 0005-7, 0018-20, 0023-24, FIGS. 2-3; Ex. 1007, Parrott, ¶¶ 530-31.)

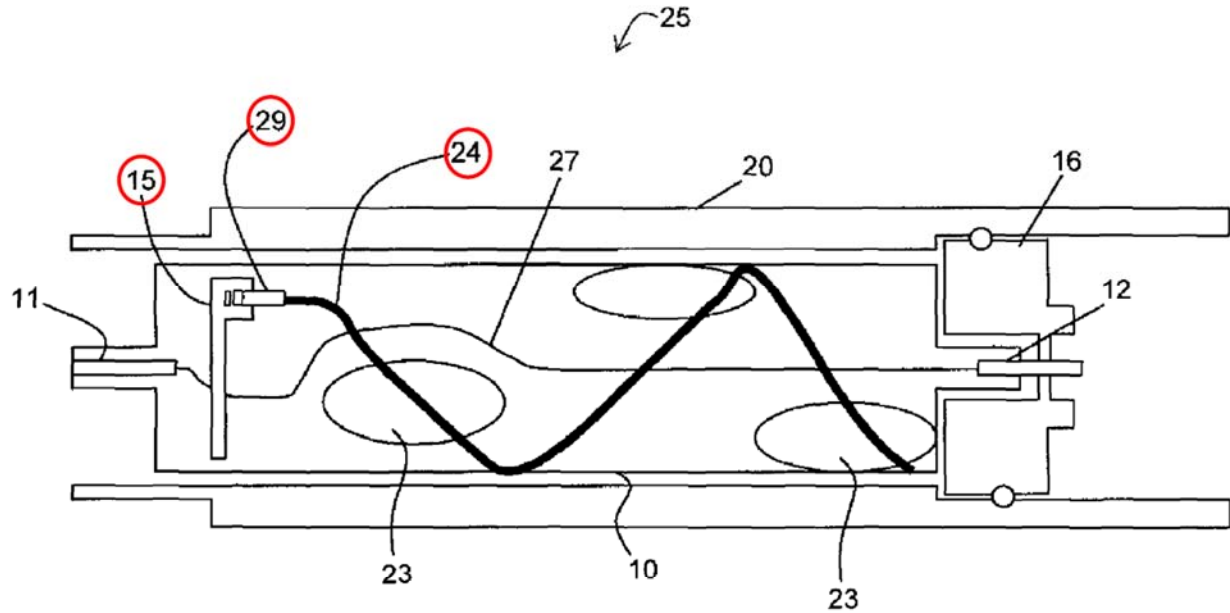


FIG. 2

**a) Obviousness of a detonating cord connecting portion of a detonator**

A POSITA implementing Black or Lanclos would be motivated to combine it with the detonating cord connecting portion teachings of common knowledge, Schacherer, Rogman, Harrigan, and/or EWAPS to improve reliability of energetic transfer to the detonating cord in predictable application of known methods without unexpected results, simple substitution for their understood benefits, and obvious to try with a reasonable expectation of success. (Ex. 1007, ¶¶ 517, 522, 538.)

**7. Transporting and inserting detonator**



Claim 13	Claim 17
(f) transporting the perforation gun system to a wellbore site, wherein at least one of steps (a), (b), and (d) is performed before transporting the perforation gun system, and step (c) is performed at the well bore site.	wherein one or more of steps (a), (b)(e), and (d) is performed at a factory or a facility that is not a wellbore site.

**a) Indefiniteness, lack of written description, and construction of transporting elements**

What constitutes “the perforation gun system,” that is being transported is ambiguous. (Ex. 1001, 9:25-30, 9:63-67; Ex. 1007, Parrott, ¶ 550.) Claim 13 defines the perforation gun system as the thing that is made by following steps a-f, but then “the perforation gun system” cannot be transported before step (c) happens because it would not yet exist. (Ex. 1007, Parrott, ¶ 551.) This ambiguity renders Claim 13 indefinite. *Id.*

Alternatively, a POSITA could read Claim 13 as requiring only that **any** product of steps (a), (b), or (d) be transported to the well site. (Ex. 1007, Parrott, ¶ 552.) This ambiguity renders Claim 13 indefinite. *Id.*

Claim 13 appears to require that one of (a), (b), or (d) happen away from the wellbore site, while Claim 17 appears to require only that any of (a), (b), (d), **or** (e) happen away from “a wellbore site”. (*Id.* at 553.) Alternatively, this could be interpreted as meaning a method where steps (a), (b), (d), and (e) are all performed at **any** site with a well would be outside the scope of Claim 17, but the Patent

provides no written description to support such a claim limitation. (*Id.* at 554.) This ambiguity renders Claim 17 indefinite. *Id.*

A POSITA's best guess at the meaning of these limitations of Claim 13 and 17 is that perforating guns are at least partially assembled away from a wellsite location and subsequently transported to the wellsite location where the detonator is installed. (*Id.* at 556.)

**b) A POSITA's common knowledge includes transporting and inserting detonator**

A POSITA would know that it is normal practice for perforating guns to be at least partially assembled away from a wellsite location and transported to the wellsite where the detonator is installed as claimed. (Ex. 1007, Parrott, ¶¶ 557, 571.)

**c) Schacherer teaches transporting and inserting detonator**

Schacherer teaches “[g]enerally, perforating guns are not transported to a wellsite with an electrical detonator coupled to a detonating cord.” (Ex. 1004, 1:12-13; Ex. 1007, Parrott, ¶ 544.) Schacherer teaches assembly of perforating guns away from the wellsite, including at least one of the steps of (a), (b), or (d). (Ex. 1004, 6:23-45, 8:26-28, FIG. 8, Ex. 1007, Parrott, ¶¶ 558-62.)

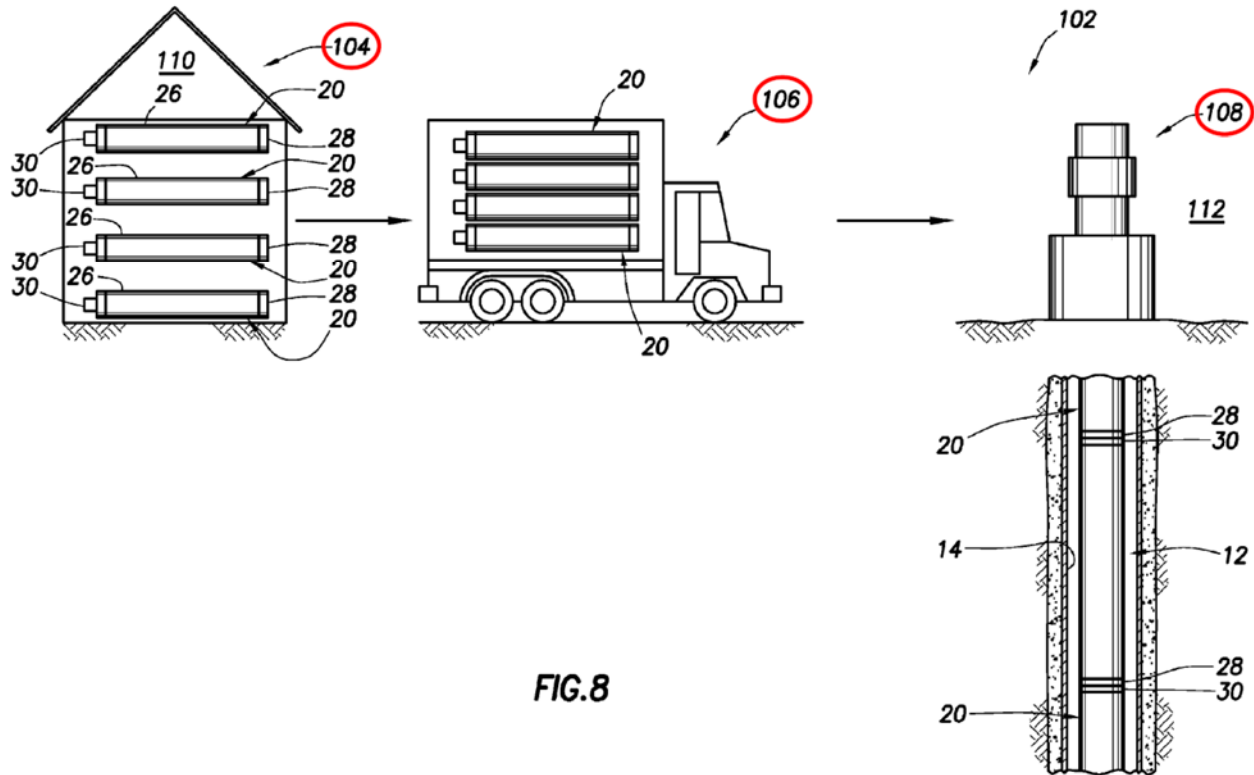


FIG. 8

Schacherer teaches Claim 13 limitation (f) and Claim 17. (Ex. 1007, Parrott, ¶ 563.)

**d) Harrigan teaches transporting and inserting detonator**

Harrigan teaches the desirability of assembling perforating guns away from a wellsite and the reality that “the unarmed gun and detonator are separately delivered to the oilfield location where assembly may be completed,” as claimed. (Ex. 1012, ¶ 0006; Ex. 1007, Parrott, ¶ 564.)

**e) Rogman teaches transporting and inserting detonator**

Rogman teaches “pre-wired loading tubes 110 can then be delivered on-site, where a user in the field can the insert one or more initiators.” (Ex. 1014, ¶¶ 0002,

0034, 0036; Ex. 1007, Parrott, ¶ 565.) Therefore Rogman teaches Claim 13 limitation (f) and Claim 17. *Id.*

**f) Black teaches transporting and inserting detonator**

A POSITA reading Black in light of their understanding of common industry practices and safety requirements would understand the perforating gun of Black is assembled away from the well site while the “method or process of arming,” including inserting the arming device 26 would take place at the well site. (Ex. 1002, ¶¶ 0026-27; Ex. 1007, Parrott, ¶ 566.) Therefore Black teaches Claim 13 limitation (f) and Claim 17. *Id.*

**g) Lanclos teaches transporting and inserting detonator**

Lanclos teaches “detonators are connected to the detonating cords in the field,” and “Perforating guns when delivered to the field generally have the shaped charges and detonating cord installed.” (Ex. 1015, 2:22-37; Ex. 1007, Parrott, ¶ 567.) Therefore Lanclos teaches Claim 13 limitation (f) and Claim 17. *Id.*

**h) Goodman teaches transporting and inserting detonator.**

Goodman teaches “all the pieces are assembled together except the detonator and shipped to the location [where] the detonator is installed.” (Ex. 1018, ¶ 0005; Ex. 1007, Parrott, ¶¶ 568-69.) Therefore Goodman teaches Claim 13 limitation (f) and Claim 17. *Id.*

**i) Obviousness of transporting and inserting detonator**

A POSITA implementing EWAPS would be motivated to combine it with the insertion of the detonator at a wellsite teachings of common knowledge, Schacherer, Black, Rogman, Harrigan, Goodman and/or SLB Catalog to improve safety and reliability using common industry practice, which would be obvious to try with predictable results. (Ex. 1007, Parrott, ¶ 572.)

A POSITA designing or operating perforating guns would look to standard industry safety practices, including common knowledge in the art, as taught in Schacherer, Harrigan, Rogman, Lanclos, Goodman, and SLB Catalog to ensure safety by transporting perforating guns to a wellsite before inserting a detonator. (Ex. 1007, Parrott, ¶ 573-78.)

**F. Additional Limitations**

**1. Wires**

<b>Claim 7</b>	<b>Claim 9</b>	<b>Claim 20</b>
[wherein the detonator includes]  a signal-in wire electrically connected to the wireless signal-in connector	[a modular detonator comprising]  a signal-in wire electrically connecting at least in part the wireless signal-in connector to at least one of the detonator components	[wherein the detonator further includes]  a signal-in wire electrically connecting at least in part the wireless signal-in connector to at least one of the detonator components.

Claim 2	Claim 13	Claim 15
A through wire for relaying an electrical signal along a length of the charge holder,	(d) connecting a through wire to the wireless through wire connector	
wherein the through wire is a wire and the wireless through wire connector is in electrical contact with the through wire		wherein the through wire is a wire, and the wireless through wire connector of the detonator is in electrical contact with the through wire.

Claim 7	Claim 11
[wherein the detonator includes]  a ground wire electrically connected to the wireless ground contact connector.	the modular detonator further comprising  a ground wire electrically connected to the wireless ground contact connector.

**a) Construction of wires**

As discussed above, the terms “wireless” and “wireless signal-in connector” introduce uncertainty into the claims, particularly here where a “wire” is connected to something that is called “wireless.” (Ex. 1007, Parrott, ¶¶ 580, 606, 633.) Worse, the claims include the limitation “wherein the through *wire is a wire*” meaning that a wire may not necessarily be a wire. (*Id.* at 606.) Therefore, Claims 2, 7, 9, 13, 15, and 20 are indefinite. (*Id.* at 580, 606, 633.)

A POSITA's best guess as to the meaning of this limitation of Claim 7 and 11 is a wire electrically connected to the "wireless ground contact connector." (*Id.* at 634.)

As discussed above, the Patent fails to provide a written description corresponding to "detonator components." (*Id.* at 581.) As discussed above, the term "detonator components" inserts uncertainty to the scope of Claims 9 and 20, making them indefinite. *Id.*

As discussed above, the term "signal-in" is not given any meaning in the Patent. (*Id.* at 582.) A POSITA's best guess as to the meaning of this limitation of Claim 7 is that the detonator includes a wire electrically connected to the "wireless signal-in connector." (*Id.* at 583.)

A POSITA's best guess as to the meaning of these limitations of Claims 9 and 20 is a wire electrically connected to the "wireless signal-in connector" and some or all parts of a detonator, or a detonator assembly. (*Id.* at 584.)

The Patent variously describes a "through wire" as either part of the detonator, or a conductor traversing the length of the charge holder outside of the detonator. (Ex. 1001, 2:65-67, 6:24-28, 8:6-19, 8:37-39, 953-55, FIG. 35B; Ex. 1007, Parrott, ¶ 607.) Claim 2 says the function of the through wire is "relaying an electrical signal along a length of the charge holder," but it is still unclear whether it is referring to a wire inside the detonator that "relays" signals or a wire that physically traverses the

full length of the charge holder. (Ex. 1007, Parrott, ¶ 607.) Claims 13 and 15 leave open the possibility that the “through wire” could be *any* wire that is electrically connected to the “wireless through wire connector” at *any* point. *Id.* Therefore, Claims 2, 13, and 15 are indefinite. *Id.*

A POSITA’s best guess as to the meaning of the limitations of Claim 2 is a wire traversing the length of the charge holder and electrically connected to the “wireless through wire connector.” (*Id.* at 608.)

A POSITA’s best guess as to the meaning of these limitations of Claim 13 and 15 is electrically connecting a wire to the “wireless through wire connector”. (*Id.* at 609.)

**b) Common knowledge includes wires**

A POSITA’s common knowledge would include wires connecting signal-in and ground contacts to some part of a detonator. (*Id.* at 585, 635.) Common knowledge would include a wire connecting a through wire contact to some part of a detonator and a wire traversing the length of the charge holder electrically connected to the same contact. (*Id.* at 610.) Therefore, common knowledge teaches the claimed wires. (*Id.* at 585, 610, 635.)

**c) Schacherer teaches wires**

Schacherer teaches a detonator that includes a signal-in wire (e.g., wires 96 and 100) electrically connected to the wireless signal-in connector and a ground wire



(e.g., wires 94 and 98) electrically connected to the wireless ground connector. (Ex. 1004, 6:13-22, FIG. 7; Ex. 1007, Parrott, ¶¶ 586, 636.)

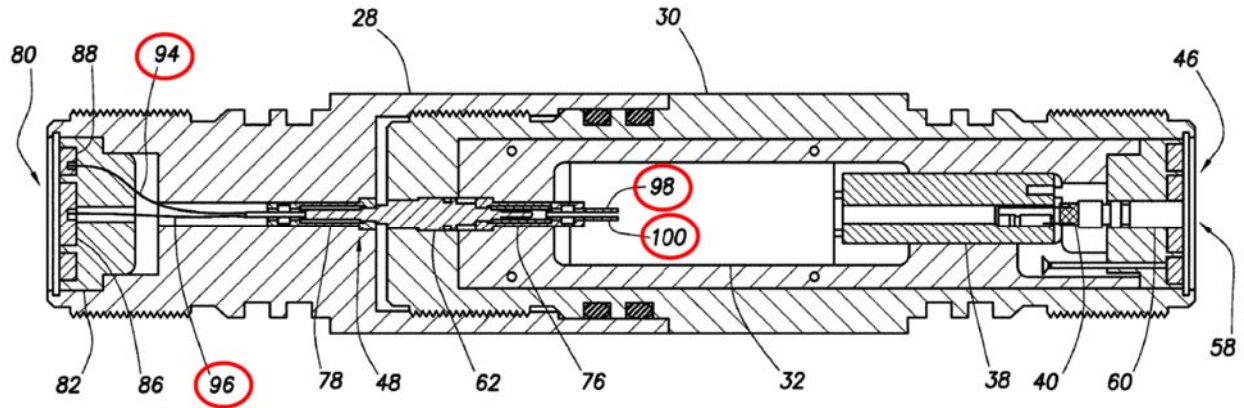


FIG. 7

Schacherer teaches a signal wire in the detonator at least as shown in the annotated figures below. (Ex. 1004, FIGS. 2, 4-7; Ex. 1007, Parrott, ¶ 587.)

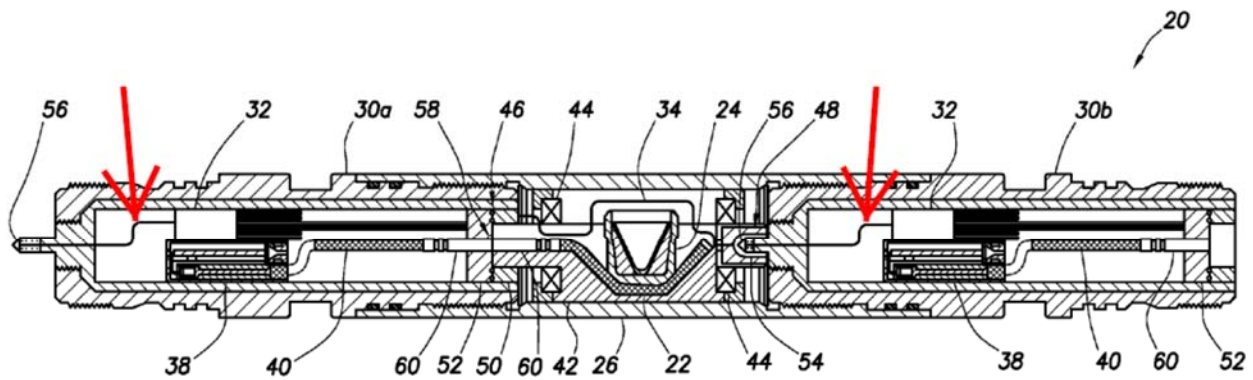


FIG. 2

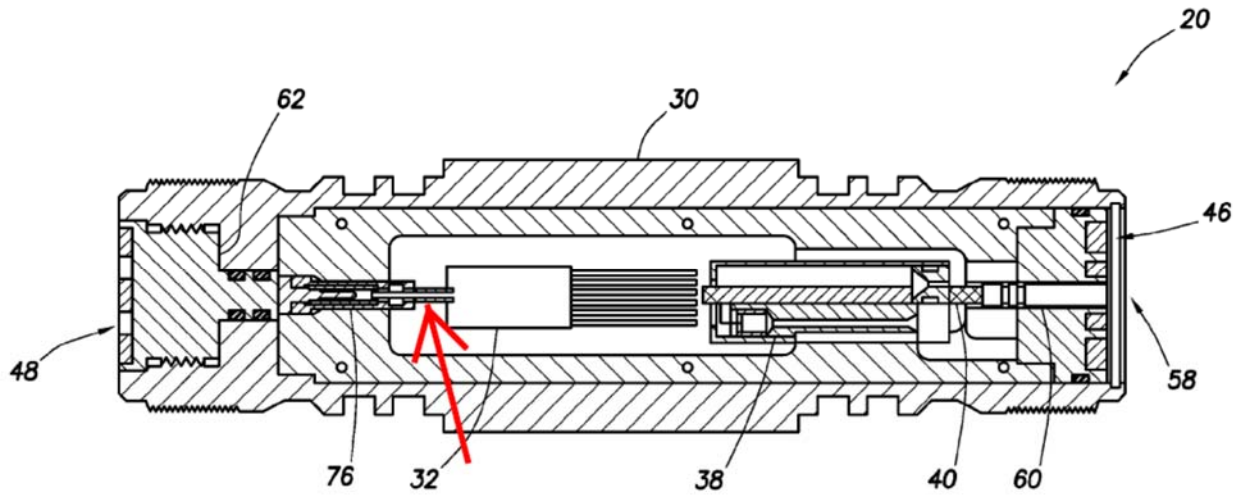


FIG. 4

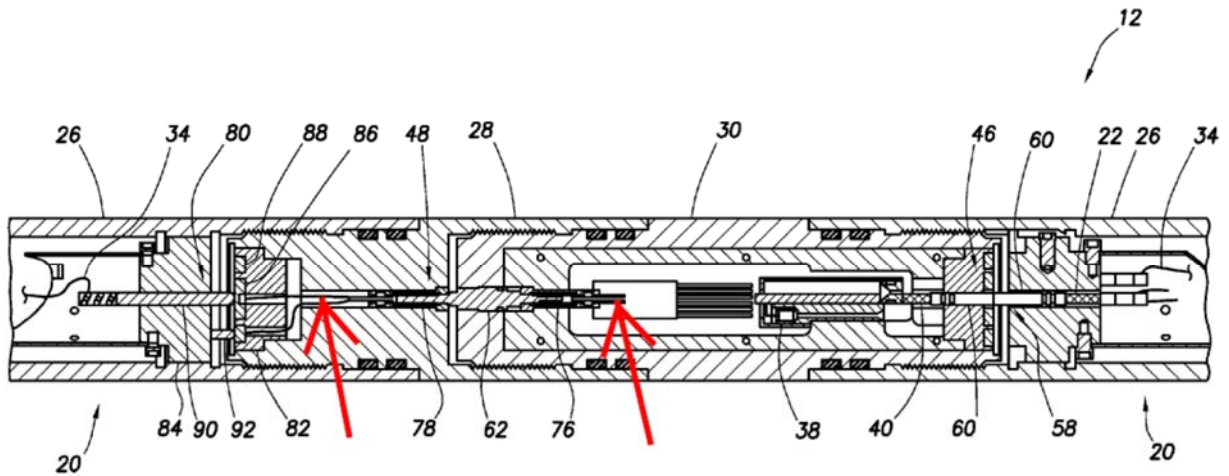


FIG. 5

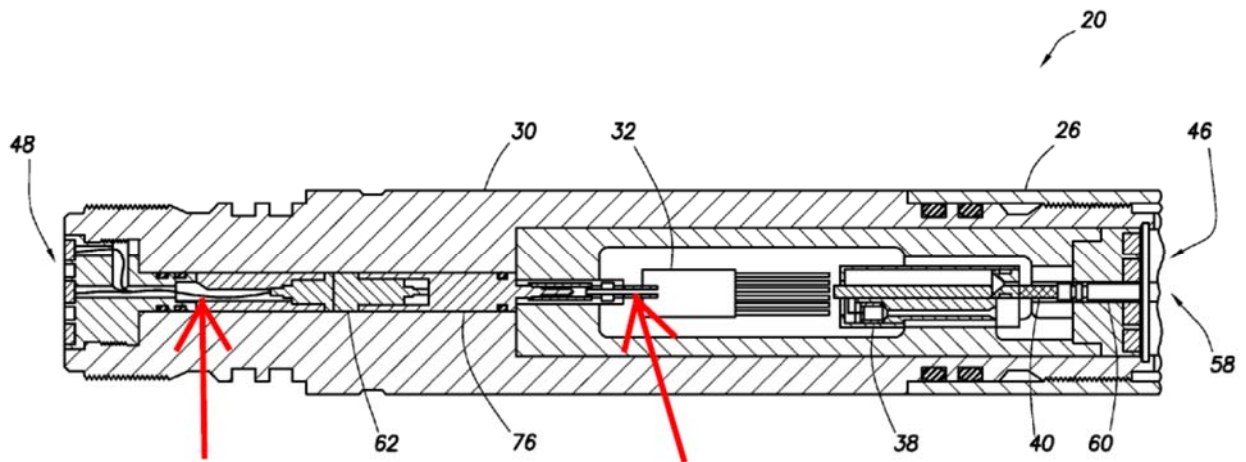


FIG. 6

Schacherer teaches a ground wire in the detonator at least as show in the annotated figures below. (Ex. 1004, FIGS. 4-7; Ex. 1007, Parrott, ¶ 637.)

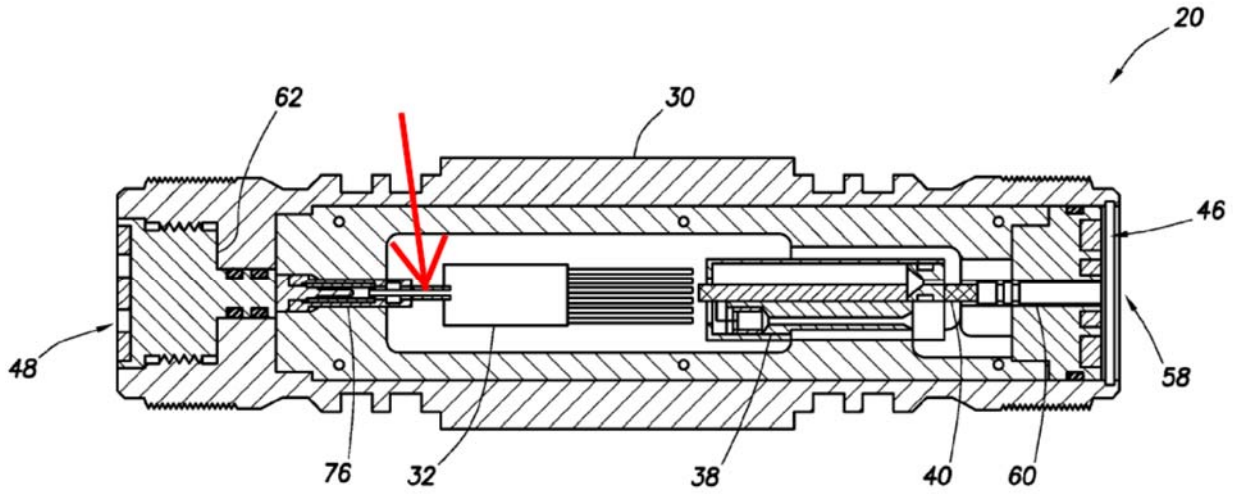


FIG. 4

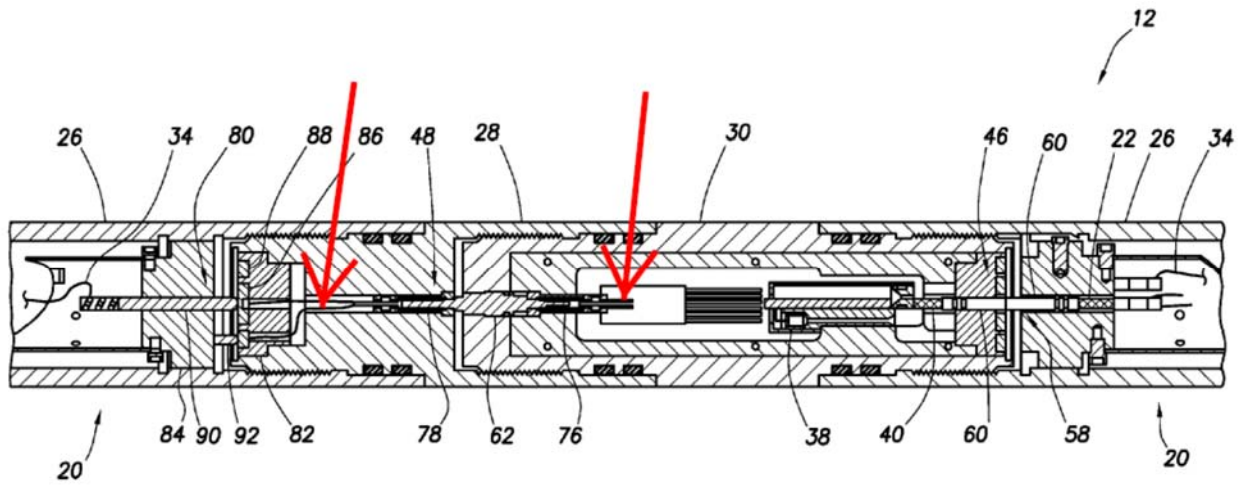


FIG. 5

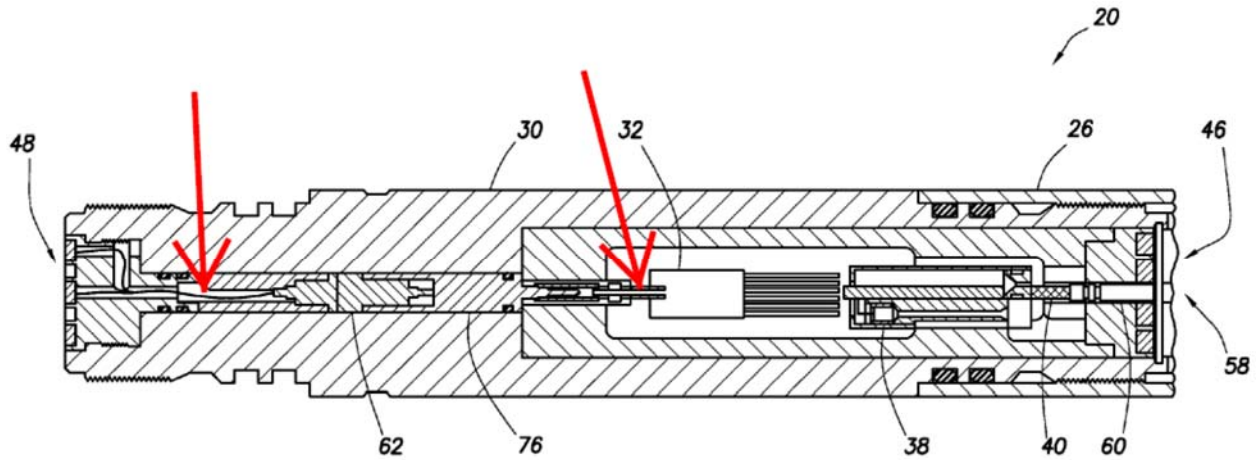


FIG. 6

Schacherer teaches electrical contacts that “electrically connect the selective firing module 32 to an electrical conductor 34” traversing the loading tube. (Ex. 1004, 4:5-10, 7:66-8:1, FIGS. 2, 5; Ex. 1007, Parrott, ¶¶ 611-12.)

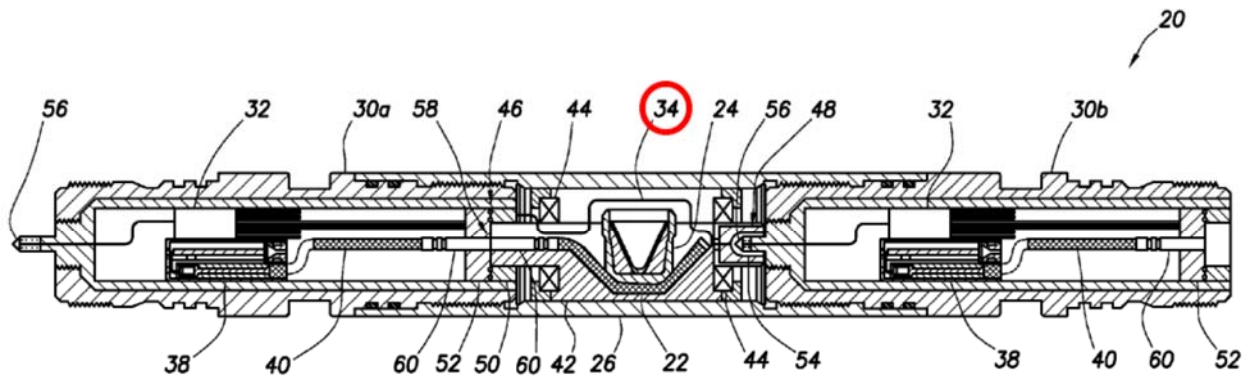


FIG. 2

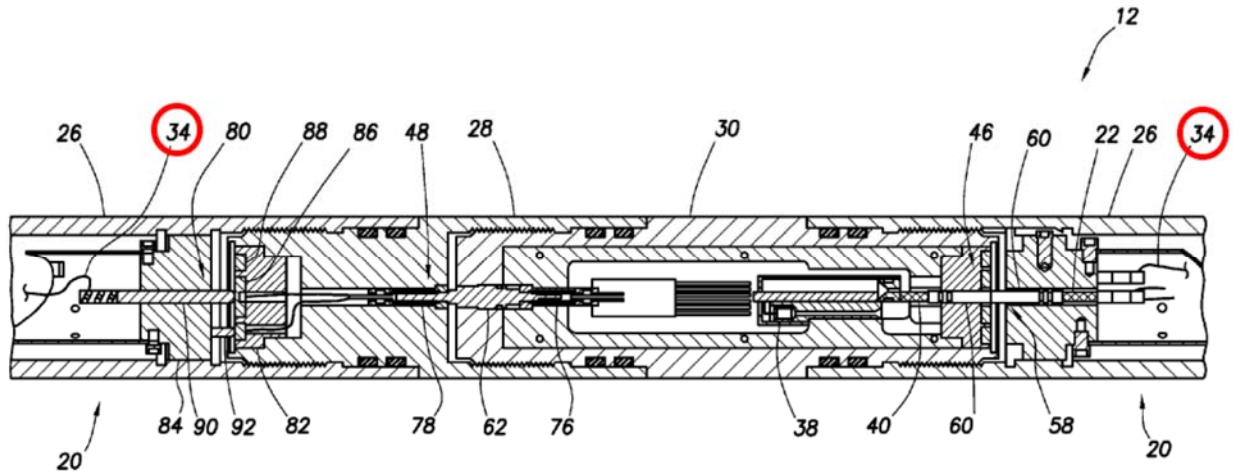


FIG. 5

Therefore Schacherer teaches the claimed wires. (Ex. 1007, Parrott, ¶¶ 588, 613, 638.)

**d) Harrigan teaches wires**

Harrigan requires wires inside initiator assembly module 125 connecting the detonator 301 to a signal-in and ground contact of the electrical connection 430 to function. (Ex. 1012, ¶¶ 0010, 0022-23, 0027, 0032, 0038, 0042, 0044, FIG. 3A; Ex. 1028, pp. 5, 7; Ex. 1007, Parrott, ¶¶ 589, 639.) Harrigan shows signal-in and ground wires connecting detonator 301 inside initiator assembly module 125. *Id.*

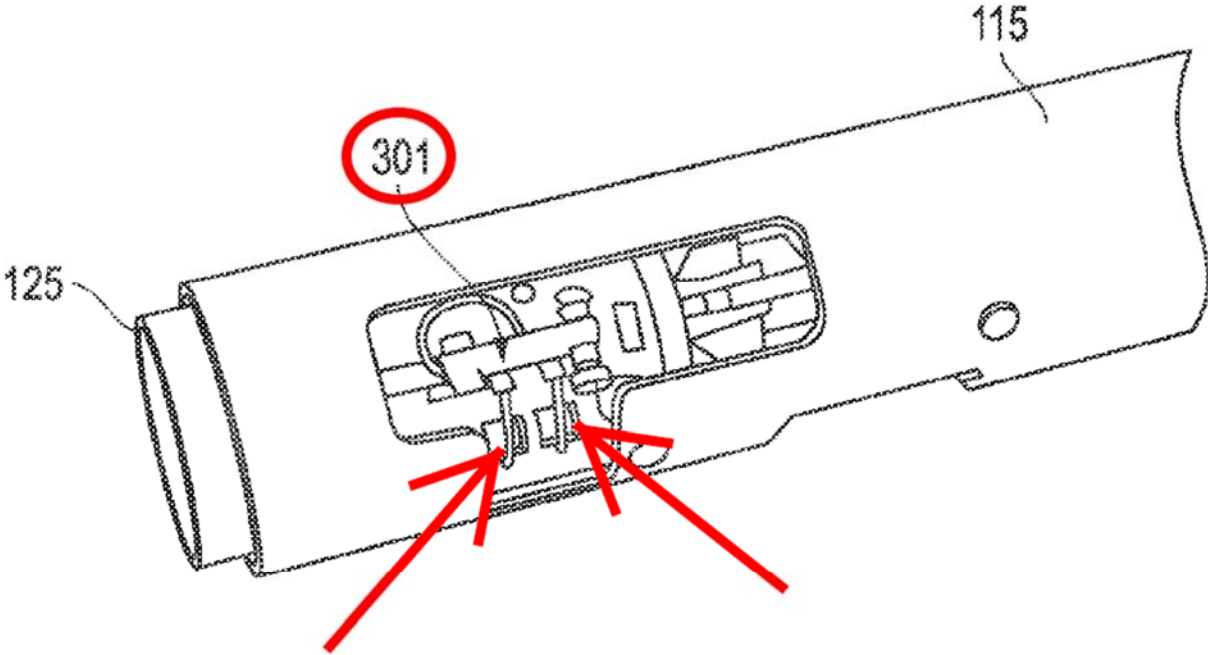
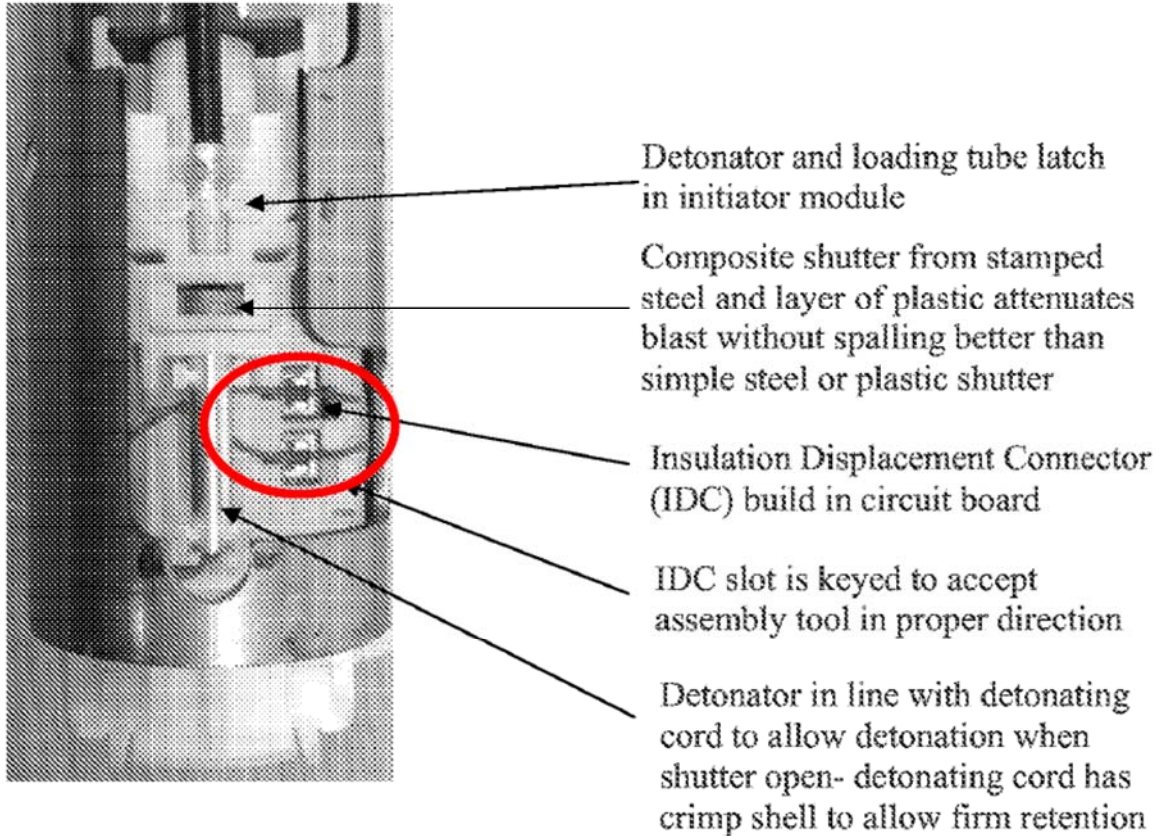


FIG. 3A



**Fig. 4: Loading Tube End (Top)**

Harrigan teaches that communications are wired (and secured by fasteners 215) through the loading tube between electrical connectors of initiators. (Ex. 1012, ¶¶ 0022, 0027, 0032, 0042, 0044, FIG. 2A; Ex. 1028, pp. 1, 2, 3, 7; Ex. 1007, Parrott, ¶¶ 614-616.)

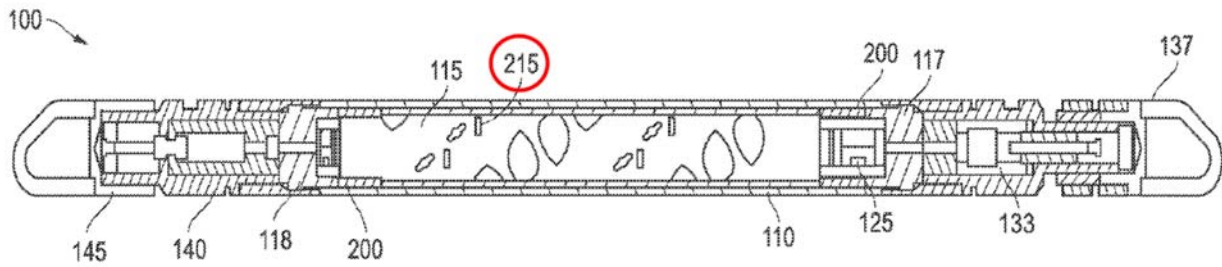


FIG. 2A

Therefore, Harrigan teaches the claimed wires. (Ex. 1007, Parrott, ¶¶ 590, 616, 640.)

**e) Rogman teaches wires**

Rogman teaches connecting the detonator to the circuit board within initiator assembly using a wire connected to signal-in contact and another connected to the ground contact of the RCA connector. (Ex. 1014, ¶¶ 31, 35-36, Claims 5, 17, 18; Ex. 1020, p. 3; Ex. 1007, Parrott, ¶¶ 591, 641.)

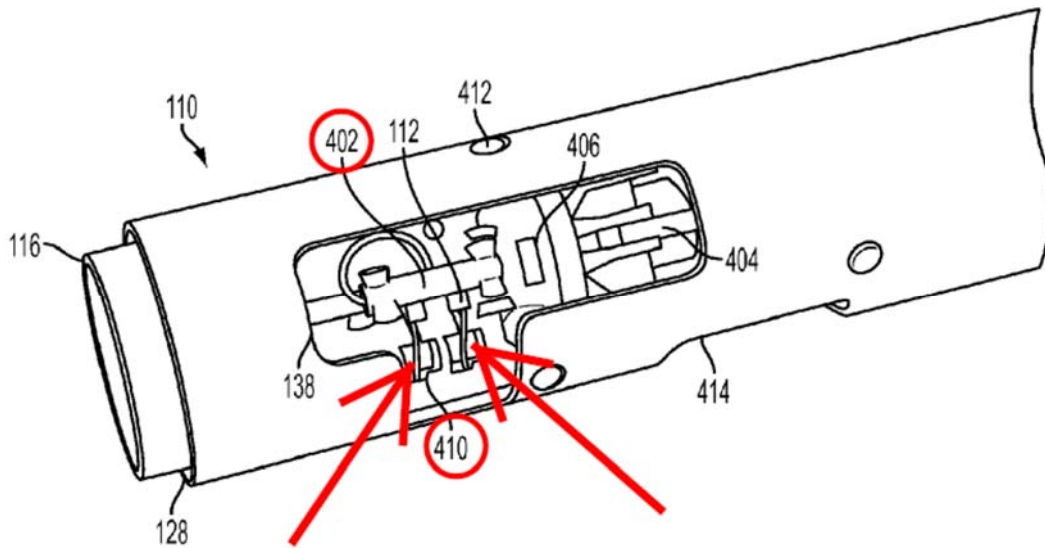
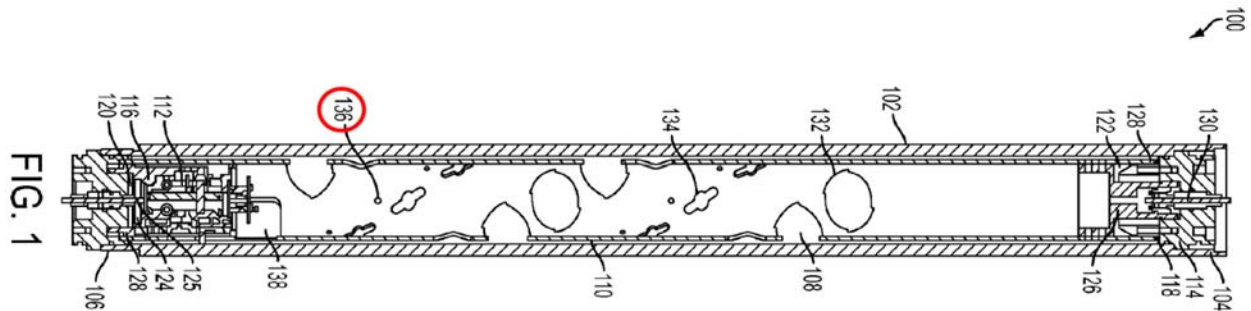


FIG. 4



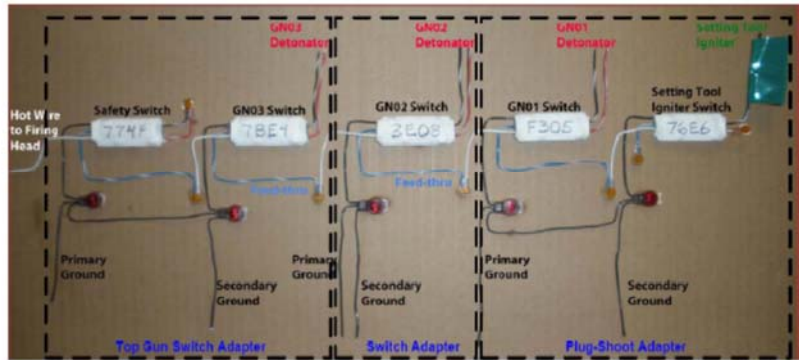
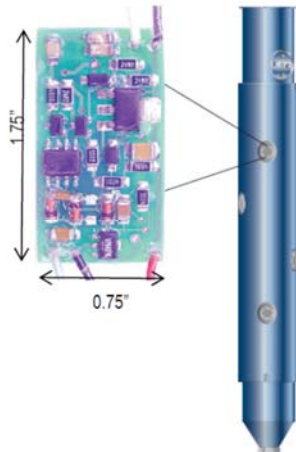
Rogman teaches a through wire connected to the through wire contact and traversing the length of the loading tube in electrical wire holders 136, 504. (Ex. 1014, ¶¶ 0020, 0033, 0034, FIGS. 1, 5, 6; Ex. 1020, pp. 1, 6-8; Ex. 1007, Parrott, ¶¶ 617-618.)



Therefore, Rogman teaches claimed wires. (Ex. 1007, Parrott, ¶¶ 592, 618, 642.)

**f) EWAPS teaches wires**

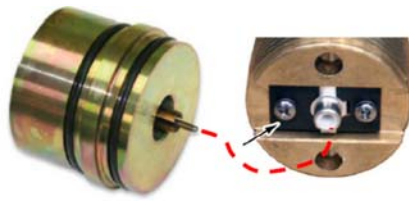
EWAPS teaches a signal-in (hot), ground, and feed-thru wires associated with an addressable switch and detonator, connected to RCA connectors, and a loading tube with a channel for the through wire. (Ex. 1013, pp. 6, 10; Ex. 1007, Parrott, ¶¶ 593, 619, 643.)



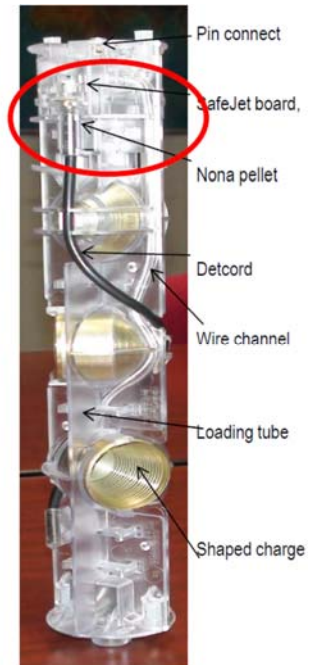
Pre-assembled with wiring and detonator cord - no booster, no crimping



SafeJet board (AFS + Secure Technology)



Disposable bulkheads

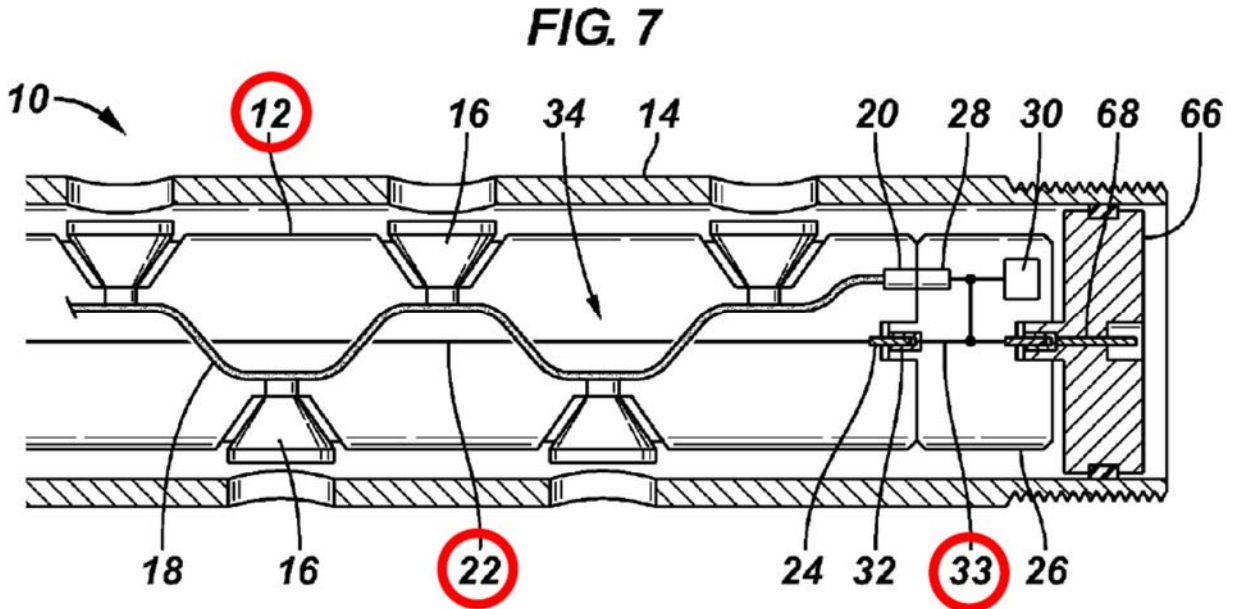


Therefore, EWAPS teaches the claimed wires. (Ex. 1007, Parrott, ¶¶ 594, 620, 644.)

**g) Black teaches wires**

As discussed above, Black's electrical connectors 32, 24 and conductors 33, 22 contain paired conductors and contacts as would be used with the disclosed RCA connectors. (Ex. 1002, ¶¶ 0024, 0028, 0034, 0041, FIGS. 2, 4, 6, 7; Ex. 1007,

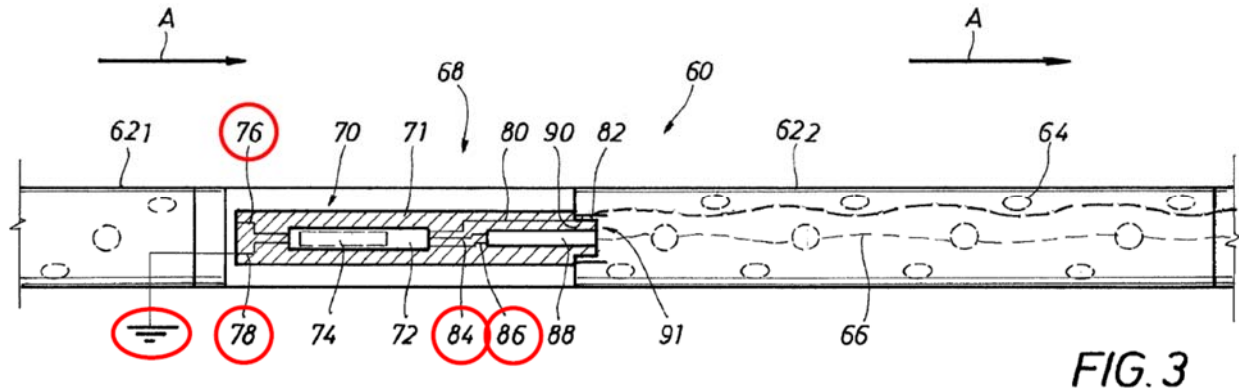
Parrott, ¶¶ 595, 645.) Conductor 33 includes wires for transmitting the signal-in and ground to firing electronics 30 and detonator 28 from the connector to function as described. *Id.* Through wire 22 is connected to a through wire contact of arming device 26 and traverses a loading tube. (*Id.* at ¶ 621.)



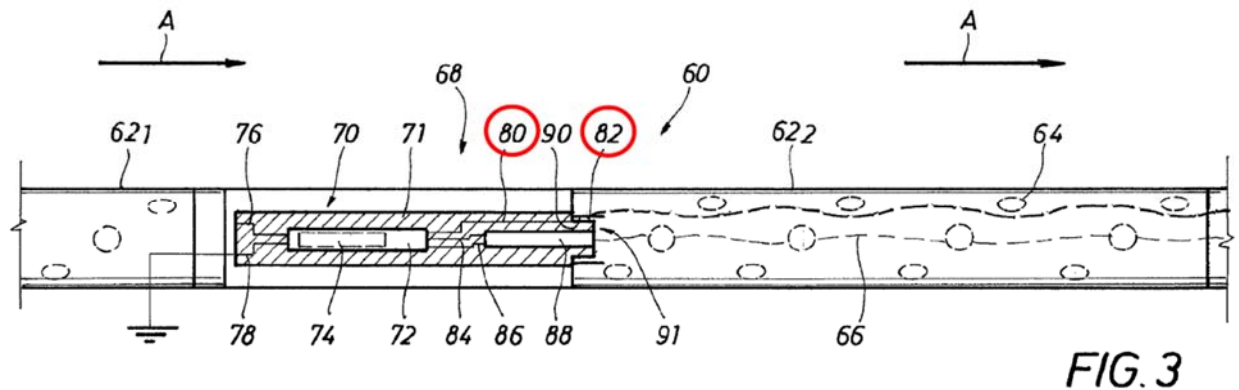
Therefore, Black teaches the claimed wires. (*Id.* at 596, 622, 646.)

**h) Lanclos teaches wires**

Lanclos teaches that cartridge assembly 70 includes inlet leads 76, 84 and ground leads 78, 86 electrically connected to the signal-in and ground electrical connectors on the end of cartridge assembly 70 and cartridge sub 68 as discussed above. (Ex. 1015, 4:63-5:23, FIGS. 3, 4; Ex 1007, Parrott, ¶¶ 597, 647.)



Lanclos teaches “a supply lead 80 that is in electrical communication with a communication line 82 shown extending within the downstream perforating gun 622,” traversing a charge holder and electrically connected through a connector. (Ex. 1015, 5:9-12, FIGS. 3, 4; Ex 1007, Parrott, ¶¶ 623-624.)



Therefore, Lanclos teaches the claimed wires. (Ex. 1007, Parrott, ¶¶ 598, 624, 648.)

**i) Goodman teaches wires**

Goodman teaches wiring 27, 46 that “is also operatively connected to RF-safe initiator 45 to provide a communication link between equipment at the earth's surface and RF-safe initiator 45,” including a communications link through the perforating

string. (Ex. 1018, ¶¶ 0020, 0024, Claims 1, 5, 13; Ex. 1007, Parrott, ¶¶ 599, 625, 649.) Goodman's initiator 15, 45, and 47 would include wires for connecting the electrical connectors to the electronics board and addressable switch to function, including a signal-in wire and ground wire electrically connected to the respective connectors. *Id.* A POSITA would understand that Goodman's wiring includes signal-in, ground, and through wires from the connector 11 or 12 to the initiator 15. *Id.*

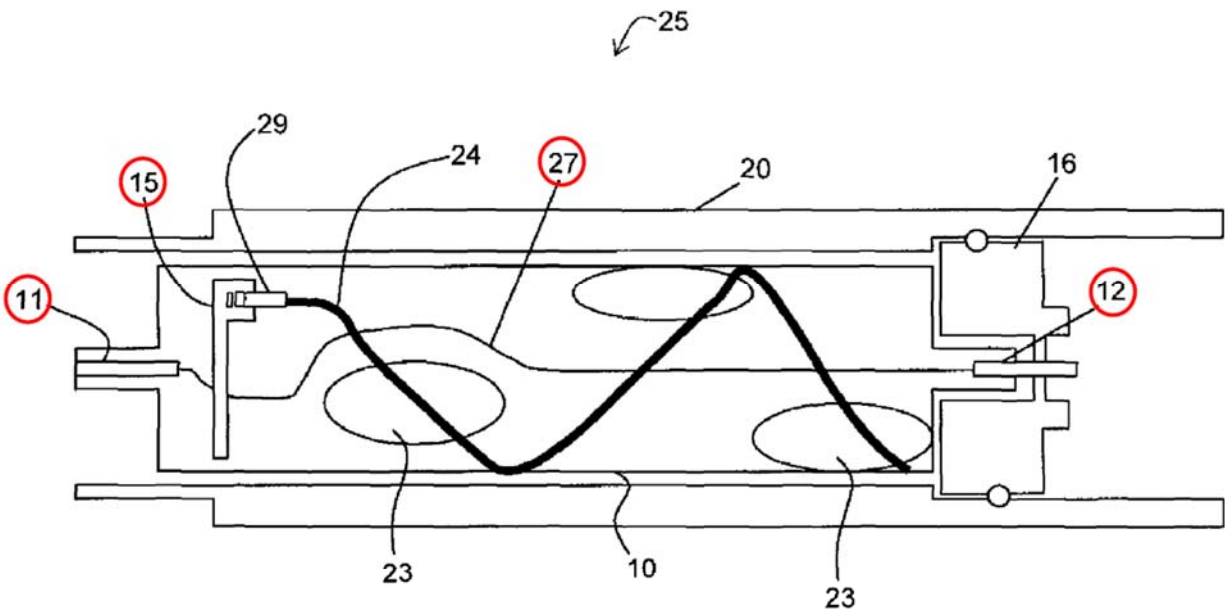


FIG. 2

Therefore, Goodman teaches the claimed wires. (Ex. 1007, Parrott, ¶¶ 600, 626, 650.)

**2. Injection Molded**

<b>Claim 3</b>	<b>Claim 6</b>
wherein the charge holder is an injection molded part.	wherein the top connector is an injection molded part.

**a) Construction of the injection molded limitations**

A POSITA’s understanding of the plain and ordinary meaning of these terms is the claim language as it is written. (Ex. 1007, Parrott, ¶ 660.)

**b) A POSITA’s common knowledge includes the injection molded limitations**

A POSITA would be familiar with the use of injection molded composites in downhole tools, their reduced costs, and suitability for construction of charge holders and connectors. (*Id.* at 661.) This is supported by the Patent not describing the “how” and “why” parts might be injection molded. *Id.*

**c) Obvious to modify Schacherer to include the injection molded limitations**

Schacherer teaches that perforating gun components are made out of non-metallic composite materials as opposed to electrically conductive materials such as steel. (Ex. 1004, 5:11-21, 6:18-22 FIG. 3; Ex. 1010, pp. 22-24; Ex. 1007, Parrott, ¶ 662.) A POSITA would be motivated by this suggestion in Schacherer, and a desire to implement is a common cost effective technique with inherent electrical insulation as taught by the following references to combine Schacherer with the injection

molded charge holders and top connectors Rogman, Harrigan, EWAPS, Lendermon and/or Goodman to teach the claimed injection molded parts. (Ex. 1007, Parrott, ¶¶ 663-65, 679.)

**d) Harrigan teaches the injection molded limitations**

Harrigan teaches manufacturing connector 530, centralizer rings 200, initiator 115, and connector 400 are injection molded. (Ex. 1012, ¶¶ 0034, 0042, 0044, FIGS. 1A, 2B, 3A, 4A; Ex. 1028, 1-7; Ex. 1007, Parrott, ¶ 666.) Therefore, Harrigan teaches this limitation of Claim 6.

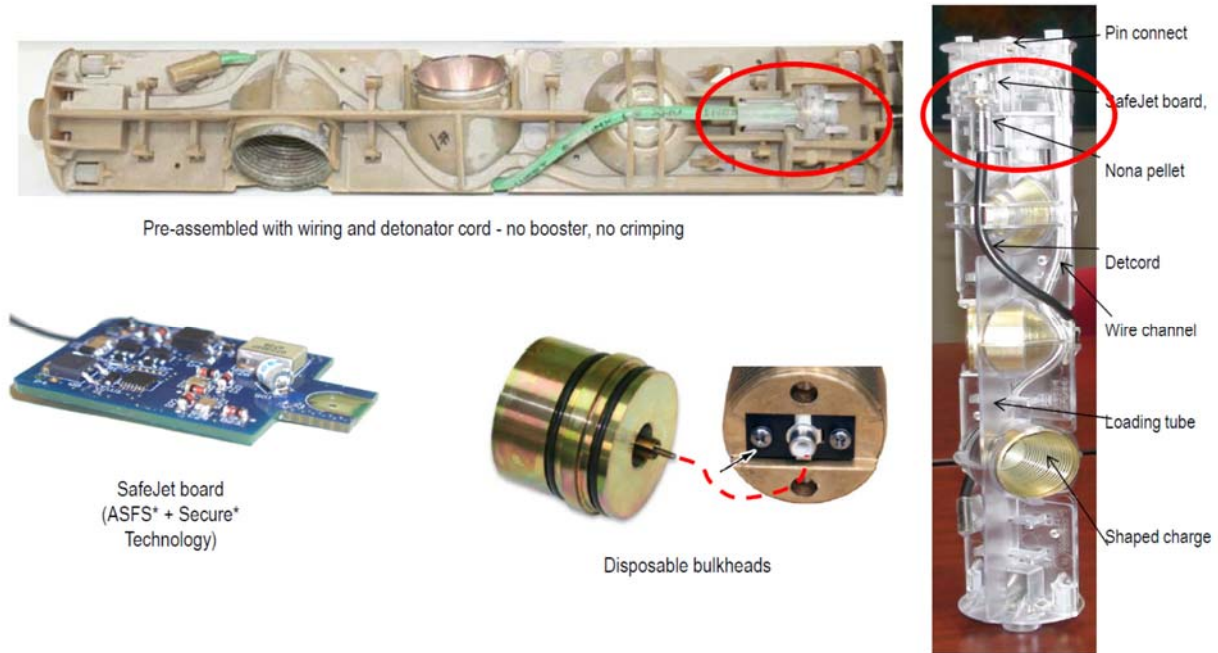
**e) Rogman teaches the injection molded limitations**

Rogman teaches injection molding “the component parts” of a perforating gun, including the loading tube, the initiator, and lower connector. (Ex. 1014, ¶¶ 0022, 25, 27, 32; Ex. 1020, pp. 2-8; Ex. 1007, Parrott, ¶¶ 667-68.)

Therefore, Rogman teaches the limitations of Claims 3 and 6. (Ex. 1007, Parrott, ¶ 669.)

**f) EWAPS teaches the injection molded limitations**

EWAPS teaches a POSITA an injection molded charge holder and a detonator in an injection molded housing adjacent to it. (Ex. 1013, p. 010; Ex. 1007, Parrott, ¶ 670.)



Therefore, EWAPS teaches the limitations of Claims 3 and 6. (Ex. 1007, Parrott, ¶ 671.)

**g) Obvious to modify Black with injection molded limitations**

Obvious to modify parts to be made of injection molded material. A POSITA would understand the examples of arming device 26 would be best made from injection molded material to produce the interlocking features described. (Ex. 1007, Parrott, ¶ 672.) A POSITA implementing Black, would be motivated to combine it with the injection molded top connector and charge holder of common knowledge, Rogman, Harrigan, EWAPS, Lendermon, and/or Goodman because injection molding is a common cost-effective technique to make the examples of arming device 26 taught in Black and charge holders in volume, produces electrically



insulating parts, and would be obvious to try with predictable results. (Ex. 1007, ¶ 681.)

**h) Lanclos teaches the injection molded limitations**

Lanclos teaches that a POSITA could produce the described systems using different materials, motivating them to look to teachings of alternative materials. (Ex. 1015, 4:34-37; Ex. 1007, Parrott, ¶ 673.) A POSITA implementing Schacherer, Lanclos, or Black, would be motivated to combine it with the injection molded top connector and charge holder of common knowledge, Rogman, Harrigan, EWAPS, Lendermon, and/or Goodman because injection molding is a common cost-effective technique to make those components in volume, produces electrically insulating parts, and would be obvious to try with predictable results. (Ex. 1007, ¶¶ 679-81.)

**i) Lendermon teaches the injection molded limitations**

Lendermon teaches injection molding charge holders and connectors for holding detonators. (Ex. 1003, Lendermon; 6:14-31, FIGS. 1-7; Ex. 1007, Parrott, ¶¶ 674-75.) Therefore, Lendermon teaches the limitations of Claims 3 and 6. (Ex. 1007, Parrott, ¶¶ 674-77.)

**j) Goodman teaches the injection molded limitations**

Goodman teaches an injection molded loading tube. (Ex. 1018, ¶ 0019; Ex. 1007, Parrott, ¶ 678.) A POSITA reading Goodman would understand that some component must hold the detonator close to the detonating cord and would understand that to be an injection molded part as a component of loading tube 10. *Id.*

Therefore, Goodman teaches the limitations of Claims 3 and 6. *Id.*

### **3. Continuity Test**

<b>Claim 18</b>
-----------------

performing a continuity test to ensure continuity between one or more electrical connections of the perforation gun system.
---

#### **a) Construction of a continuity test**

The Patent specification does not discuss this limitation, but instead “a continuity test to ensure complete connectivity of the detonating chord.” (Ex. 1001, the Patent, 9:65-67; Ex. 1007, Parrott, ¶ 711.) Therefore, there is no written description support for Claim 18. (Ex. 1007, Parrott, ¶ 711.)

The plain and ordinary meaning of this limitation would be “performing an electrical integrity and/or continuity test to ensure continuity between one or more electrical connections of the perforation gun system.” (*Id.* at 712.)

#### **b) Common knowledge includes a continuity test**

A POSITA would know that a continuity test is performed on electrical components prior to running a perforating gun string into the wellbore as standard procedure, industry wide, worldwide. (*Id.* at 713.) Therefore, common knowledge teaches Claim 18. *Id.*

The ubiquity of continuity tests is shown in additional references. (*Id.* at 723-24.) A continuity test is inherent in any perforating operation because industry practice and regulation would not allow perforating operations to begin without testing continuity. (*Id.* at 713.)

**c) Schacherer teaches a continuity test**

Schacherer incorporates Crawford by reference. (Ex. 1004, 3:1-4; Ex. 1007, Parrott, ¶ 720.) Schacherer/Crawford teaches diagnostic operations that include a continuity test. (Ex. 1022, Crawford, ¶¶ 0034, 0037-38; Ex. 1007, Parrott, ¶¶ 714-19.)

**d) Harrigan teaches a continuity test**

Harrigan teaches an “electronics diagnostic check run,” that would include a continuity test. (Ex. 1012, ¶ 0028; Ex. 1007, Parrott, ¶ 720.) Therefore, Harrigan teaches Claim 18. (Ex. 1007, Parrott, ¶ 720.)

**e) Black teaches a continuity test**

Ex. 1002, Black teaches, “diagnostic tests ... including firing electronics,” that would include a continuity test. (Ex. 1002, Black, ¶ 0026; Ex. 1007, Parrott, ¶ 721.) Therefore, Black teaches Claim 18. *Id.*

**f) Lanclos obvious continuity test**

Lanclos teaches the importance of “proper continuity between the wireline 16 and the detonator(s) 38.” (Ex. 1015, 2:18-21; Ex. 1007, Parrott, ¶ 722.) The emphasis on continuity in Lanclos, would motivate a POSITA to look to combine Lanclos with the continuity tests of common knowledge, Schacherer, Harrigan, and Black, rendering Claim 18 obvious. (Ex. 1007, Parrott, ¶ 722.)

**g) Obviousness of a continuity test**

A POSITA would be motivated to combine the teachings of Black with the teachings of Schacherer via the teachings of Crawford because the testing that Black teaches would be for a simple perforating system whereas the teachings of Crawford and Schacherer would be for a more complicated perforating system involving addressable style communications and switches to individual perforating gun assemblies. (Ex. 1007, Parrott, ¶ 725.) Therefore a POSITA would recognize that each of Black and Schacherer/Crawford teach, “performing a continuity test to ensure continuity between one or more electrical connections of the perforation gun system,” as claimed. *Id.*

**h) Continuity test is obvious**

A POSITA implementing Lanclos, Rogman, EWAPS, or Goodman would be motivated to combine it with the continuity test teachings of common knowledge, Schacherer, Black, or Harrigan because Lanclos emphasizes continuity, common knowledge teaches the importance of continuity testing, it improves reliability and safety, saves costs and would be obvious to try with predictable results. (Ex. 1007, ¶ 726-29.)

#### **4. Making a second gun**

<b>Claim 19</b>
-----------------

wherein performing steps (a) to (e) a first time with a first set of components completes a first perforating gun segment and the method further comprises: performing steps (a) to (e) a second time with a second set of components to complete a second perforating gun segment; and connecting the second perforating gun segment to the first perforating gun segment.
---

##### **a) Construction of making a second gun**

The Patent does not discuss or mention what a “perforating gun segment” is. (Ex. 1007, Parrott, ¶ 731.) It is unclear how, if at all, a “perforating gun segment” differs from a “perforating gun assembly,” “perforation gun system,” and/or a “perforating gun.” *Id.* Because of this lack of clarity, Claim 19 is indefinite. *Id.*

Claim 13 requires at least some assembly steps happen before transportation and some after. (*Id.* at 733.) It is unclear whether Claim 19 requires steps (a)-(e), including inserting the detonator after transport, happen a first time, before those

steps are performed “a second time.” (*Id.* at 732) Because of this uncertainty, Claim 19 is indefinite. *Id.*

A POSITA’s best guess of the meaning of Claim 19 would be assembling at least two perforating guns and connecting at least two perforating guns together. (*Id.* at 734.)

**b) A POSITA’s common knowledge includes making a second gun**

A POSITA’s common knowledge would include the assembly of multiple perforating guns and joining them together for insertion into a well. (*Id.* at 735.) As discussed above, a POSITA’s common knowledge teaches performing steps (a)-(e) of Claim 13. (*Id.* at 735.) Therefore, a POSITA’s common knowledge teaches assembling at least two perforating guns and connecting at least two perforating guns together as claimed. *Id.*

**c) Schacherer teaches making a second gun**

Ex. 1004, Schacherer teaches assembling multiple perforating guns 20 and connecting them together as claimed. (Ex. 1004, 8:6-14, 8:19-21, 8:51-59, FIGS. 1, 2, 5, 8; Ex. 1007, Parrott, ¶¶ 736-740.)

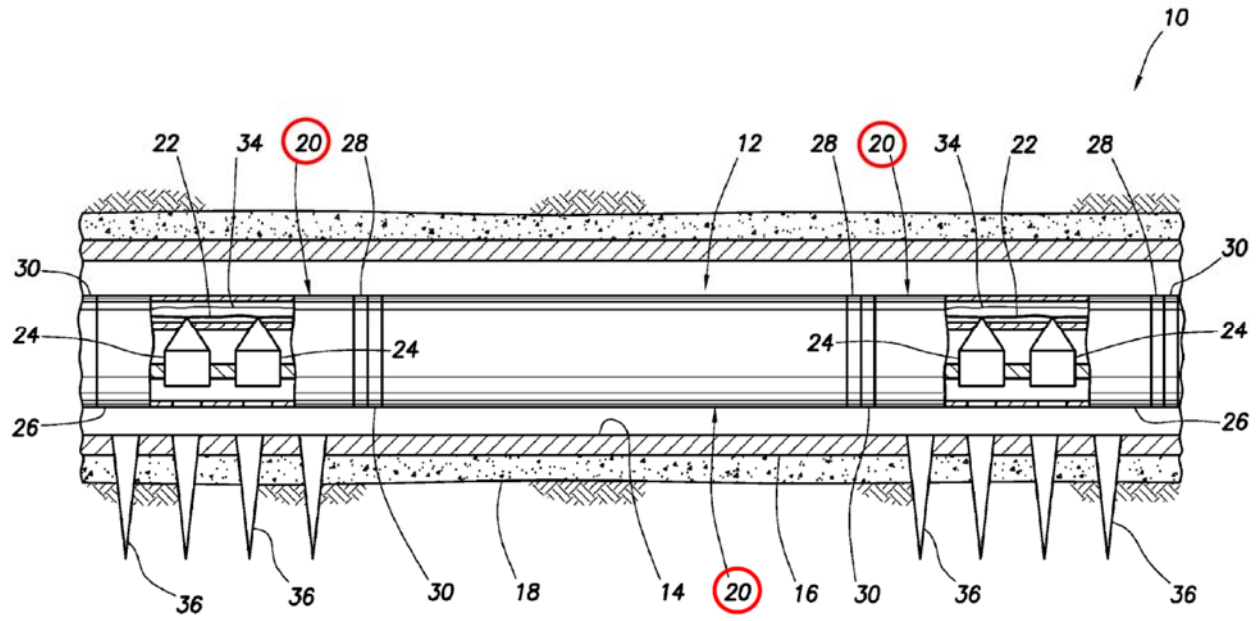


FIG. 1

**d) Harrigan teaches making a second gun**

A POSITA would understand the perforating guns of Harrigan are designed to be connected directly to each other through the carriers' male and female ends. (Ex. 1012; FIGS. 1A, 2A; Ex. 1007, Parrott, ¶ 741.) A POSITA would understand that assembling multiple guns of Harrigan would necessarily include repeating steps (a)-(e) of Claim 13 taught by Harrigan. (Ex. 1007, Parrott, ¶ 741.)

A POSITA would find it obvious to repeat steps of assembling perforating guns. *Id.*

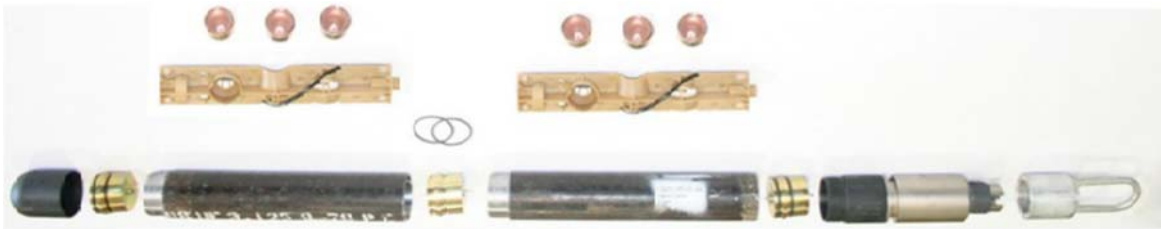
**e) Rogman teaches making a second gun**

Rogman teaches connecting multiple perforating guns in series through male and female ends. (Ex. 1014, ¶¶ 0028, 0035, FIGS. 1, 3; Ex. 1020, pp. 1-2, 6, 8; Ex.

1007, Parrott, ¶¶ 742-744.) A POSITA would understand that assembling multiple guns would necessarily include repeating steps (a)-(e) taught by Rogman as claimed. (Ex. 1007, Parrott, ¶ 745.)

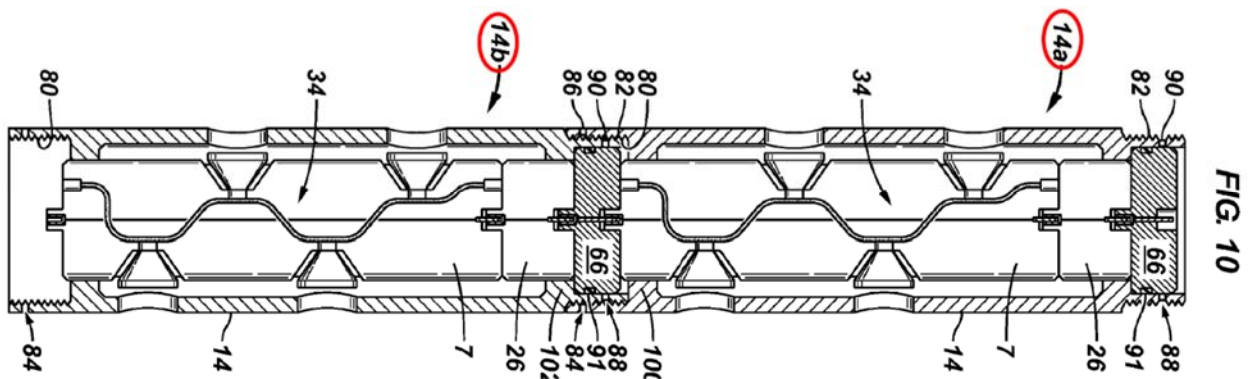
**f) EWAPS teaches making a second gun**

EWAPS teaches assembling multiple guns in series, which would necessarily include repeating the assembly steps as claimed. (Ex. 1013, pp. 5-6, 8, 11, 12; Ex. 1007, Parrott, ¶¶ 746-47.)



**g) Black teaches making a second gun**

Black teaches assembling multiple perforating guns in carriers 14a and 14b together in detail. (Ex. 1002, ¶¶ 0035-41, FIG. 10; Ex. 1007, Parrott, ¶ 748.)

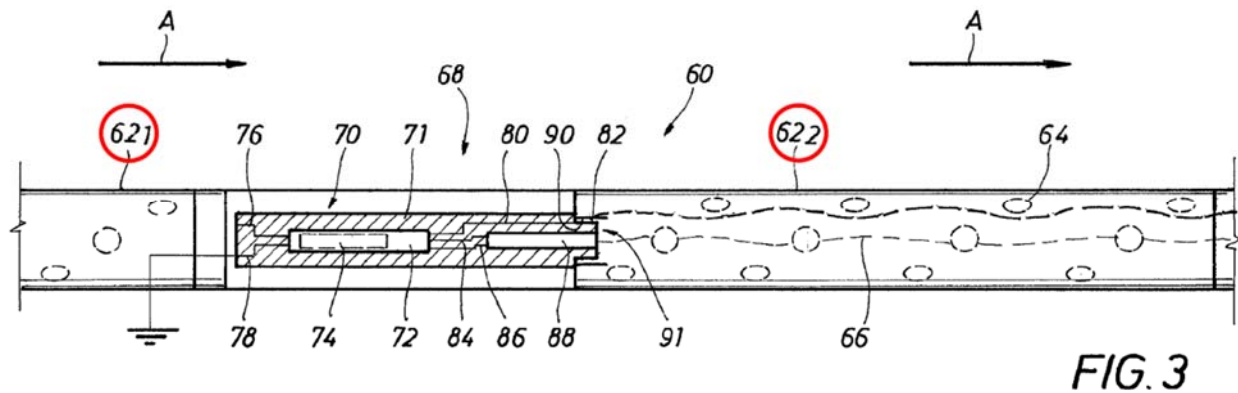




A POSITA would understand that assembling multiple guns would necessarily include repeating steps (a)-(e) taught by Black as claimed. (Ex. 1007, Parrott, ¶ 749.)

**h) Lanclos teaches making a second gun**

Lanclos teaches assembling multiple perforating guns  $62_1, 62_2, \dots, 62_n$  together in detail. (Ex. 1015, 1:35-41, 4:44-5:57, 7:1-30, FIGS. 1-3; Ex. 1007, Parrott, ¶¶ 750-51.)



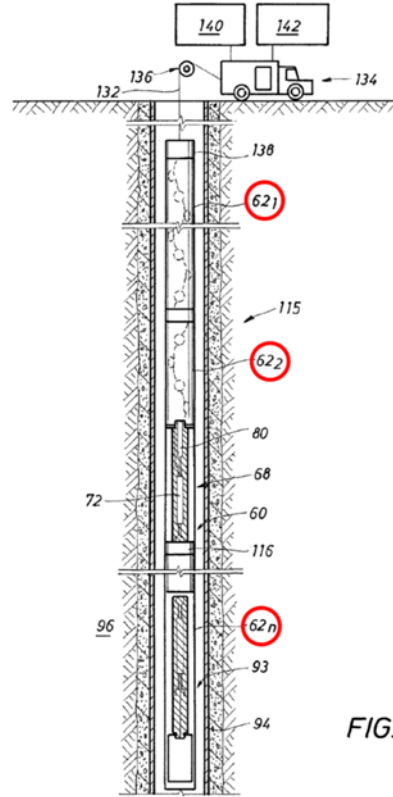


FIG. 5

A POSITA would understand that assembling multiple guns would necessarily include repeating steps (a)-(e) taught by Lanclos as claimed. (Ex. 1007, Parrott, ¶ 751.)

**i) Goodman teaches making a second gun**

Goodman teaches assembling multiple perforating guns together. (Ex. 1018, ¶¶ 0022, 0026-27, FIGS. 3, 5; Ex. 1007, Parrott, ¶ 752.)

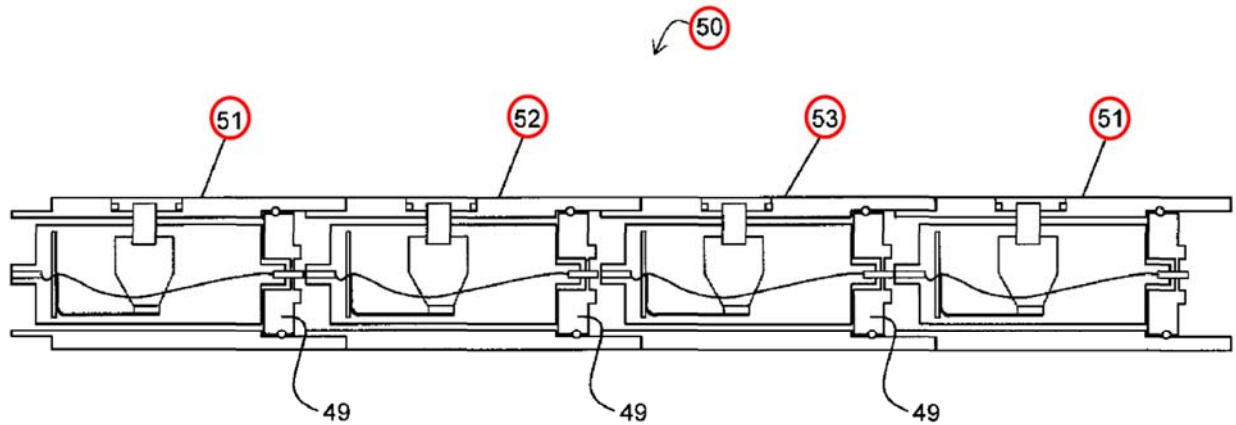


FIG. 5

A POSITA would understand that assembling multiple guns would necessarily include repeating those steps (a)-(e) taught by Goodman as claimed. (Ex. 1007, Parrott, ¶ 753.)

## V. SUMMARY

Petitioner has shown that all claims of the Patent are indefinite, lacking written description, anticipated, and/or made obvious. Accordingly, Petitioner requests institution of a Post Grant Review on all challenged claims and a determination by the Board that Claims 1-20 are invalid.

Dated: August 12, 2020

Respectfully submitted,

ARNOLD & SAUNDERS, LLP

/s/ Jason Saunders

Petition for Post Grant Review of U.S. Patent No. 10,472,938

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HUNTING TITAN INC.**

**CERTIFICATION OF SERVICE ON PATENT OWNER**

Pursuant to 37 C.F.R. §§ 42.6(e), 42.8(b)(4) and 42.105, the undersigned certifies that on the 12th day of August 2020, a complete copy of the Petitioner's Post Grant Review of U.S. Patent No. 10,472,938, Power of Attorney, and all supporting exhibits and attachments were served via e-mail and EXPRESS MAIL to the attorneys for Patent Owner:

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**HUNTING TITAN, INC.**

**CERTIFICATION UNDER 37 CFR § 42.24(d)**

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the Petition (excluding the items listed in 37 CFR § 42.24(a)(1)) totals no more than 18460 words, which is less than the 18,700 words allowed under 37 CFR § 42.24(a)(1)(ii).

/s/ Jason Saunders

Jason Saunders

**ATTORNEY FOR PETITIONER**

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