

**EXPERT DECLARATION OF EUR ING JOHN NIXON IN SUPPORT OF
SILENCERCO'S PETITION FOR *INTER PARTES* REVIEW OF:
U.S. PATENT NO. 8,286,750 B1**

I, John Nixon, declare as follows:

I. INTRODUCTION

1. I have been retained by Holland & Hart LLP on behalf of SILENCERCO WEAPONS RESEARCH, LLC ("Petitioner" or "SilencerCo") regarding the above-captioned *inter partes* review ("IPR"). I have been retained to provide my independent expert opinions and expert knowledge regarding U.S. Patent No. 8,286,750 ("the '750 Patent") entitled, "Energy Capture and Control Device."
2. I have been asked to provide information and opinions regarding the level of skill of a person of ordinary skill in the art ("POSITA") for the invention claimed in the '750 Patent, and the general knowledge of such a person at the time of the invention. I have been asked to consider what one of ordinary skill in the art before the priority date of the '750 Patent would have understood, including scientific and technical knowledge related to the '750 Patent, and whether the grounds and references cited by the Petition render the invention claimed by the '750 Patent anticipated and/or obvious. I understand that, in this IPR proceeding, Petitioner asserts that all claims (claims 1-22) of the '750 Patent ("Challenged Claims") are invalid as anticipated and/or obvious.

3. I have been asked to provide my independent technical review, insights, analysis and opinions regarding the '750 Patent, the grounds asserted by Petitioner in its Petition for *Inter Partes* Review of the '750 Patent, and the arguments and references that form the basis for such grounds asserted by Petitioner.
4. The '750 Patent generally describes energy capture and control devices configured with a central chamber, deflectors, an off-axis chamber, and a fluid outlet. The energy capture and control devices include internal walls in the off-axis chamber to produce a serpentine fluid pathway, which can be axially, radially, or helically oriented. I am familiar with the technology described in the '750 Patent as of its earliest claimed priority date, February 11, 2010.
5. I have reviewed and analyzed, and am familiar with, the '750 Patent and its file history. I confirm that to the best of my knowledge, the exhibits accompanying this declaration are true and correct copies of what they purport to be, and that, an expert in the relevant field would reasonably rely on such exhibits to formulate opinions such as the opinions I set forth herein.
6. I am being compensated at my standard rate of \$525.00 per hour for my work on this case. My compensation is in no way dependent upon the outcome of this IPR or any issue therein, nor is it contingent upon the results of my study or the substance of my testimony. I have no stake in the outcome of this IPR.

II. SUMMARY OF OPINIONS

7. It is my opinion that a POSITA would understand the ordinary and customary meaning of “a common off axis chamber” to be an off axis chamber into which at least two deflectors separately and directly deflect energy transferred from a high energy material (*i.e.*, gas and/or fluid) received by the central chamber.
8. It is my opinion that a POSITA would understand the ordinary and customary meaning of “a plurality of deflectors . . . configured to deflect the energy from the high energy material to the common off axis chamber” to be at least two deflectors each configured to deflect energy from a high energy material (*i.e.*, gas and/or fluid) to the common off axis chamber via respective separate and direct fluid connections.
9. It is my opinion that a POSITA would understand the ordinary and customary meaning of “a fluid outlet” to be an orifice through which gas flows out of the common off axis chamber.
10. It is my opinion that a POSITA would understand the ordinary and customary meaning of “a serpentine fluid pathway which is . . . radially serpentine” to be a fluid pathway that causes fluids to flow back (*e.g.*, counterclockwise) and forth (*e.g.*, clockwise) in alternate rotational directions, changing direction at least twice, while advancing outwardly along a radius of the off-axis chamber.

11. It is my opinion that a POSITA would understand the ordinary and customary meaning of “a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine” to be a fluid pathway that is both axially serpentine and radially serpentine.
12. It is my opinion that each of U.S. Patent No. 1,000,702 (“Thurler”), U.S. Patent No. 748,157 (“Bouton”), French Patent No. 493,462 (“Barlowatz”), U.S. Patent No. 582,485 (“Reeves”), and German Patent No. 305,012 (“Eichenseher”) is related to the same field of endeavor and/or reasonably pertinent to the problem addressed by the '750 Patent.
13. It is my opinion that Thurler discloses each and every element of Claims 1, 4, 5, 7-9, 15-17, 19 and 22 of the '750 Patent, arranged or combined in the same way.
14. It is my opinion that Thurler discloses, teaches, suggests, or otherwise renders obvious every element of Claims 1, 4-11, 15-17, 19, 21 and 22 of the '750 Patent.
15. It is my opinion that Thurler in view of Bouton discloses, teaches, suggests, or otherwise renders obvious every element of Claim 18 of the '750 Patent.
16. It is my opinion that Thurler in view of Barlowatz discloses, teaches, suggests, or otherwise renders obvious every element of Claims 1, 4-17 and 19-22 of the '750 Patent.

17. It is my opinion that Barlowatz discloses each and every element of Claims 1, 9, 19 and 20 of the '750 Patent, arranged or combined in the same way.
18. It is my opinion that Barlowatz discloses, teaches, suggests, or otherwise renders obvious every element of Claims 1, 9, 19 and 20 of the '750 Patent.
19. It is my opinion that Barlowatz in view of Reeves discloses, teaches, suggests, or otherwise renders obvious every element of Claim 2 of the '750 Patent.
20. It is my opinion that Eichenseher in view of Barlowatz discloses, teaches, suggests, or otherwise renders obvious every element of Claims 1, 3, 4, 5, 8, 9, 18 and 19.

III. BASIS FOR OPINIONS

21. My opinions and analysis set forth in this Declaration are based on my personal knowledge and experience, including my education, training, and work experience in firearms, firearm components/accessories, suppressors/silencers, ballistics, wound ballistics and the analysis, design, research and manufacturing of the same. I have reviewed the '750 Patent, its prosecution history, and the references identified by Petitioner in this IPR proceeding.

IV. MATERIALS CONSIDERED

22. I have also carefully reviewed the Petition for which I provide support with this Declaration. For reference, below is a list of documents I have reviewed and

analyzed as part of conducting my analysis and forming my opinions in this IPR proceeding.

Exhibit No.	Description
1001	US Pat. No. 8,286,750 to Oliver
1002	US Prov. App. No. 61/303,553 for U.S. Pat. No. 8,286,750
1003	US Prov. App. No. 61/418,285 for U.S. Pat. No. 8,286,750
1004	US Pat. No. 8,286,750 Prosecution History
1005	US Pat. No. 7,987,944 to Brittingham
1006	US Pat. No. 6,425,310 to Champion
1007	US Pat. No. 7,207,258 to Scanlon
1008	US Pat. No. 5,952,625 to Huff
1009	US Pat. No. 5,029,512 to Latka
1010	US Pat. No. 6,796,214 to Hausken
1011	US Pat. No. 5,078,043 to Stephens
1012	US Pat. No. 1,341,363 to Fiala
1015	US Pat. No. 1,000,702 to Thurler
1016	US Pat. No. 748,157 to Bouton
1017	FR Pat. No. 493,462 to Barlowatz
1018	FR Pat. No. 493,462 to Barlowatz (Certified Translation)
1019	US Pat. No. 582,485 to Reeves
1020	DE Pat. No. 305,012 to Eichenseher
1021	DE Pat. No. 305,012 to Eichenseher (Certified Translation)
1022	Sound Suppressor for the MP40
1023	A MAC History Lesson
1024	US Pat. No. 3,500,955 to Werbell
1025	US Pat. No. 1,797,310 to Wright
1026	US Pat. No. 3,913,703 to Parker
1027	US Pat. No. 5,659,158 to Browning
1028	US Pat. No. 5,136,923 to Walsh
1029	US Pat. No. 8,096,222 to Silvers
1030	US Pat. No. 9,347,727 to Cler
1031	Compact Thermoelectric Converter by NASA
1032	Complaint in <i>HuxWrx Safety Co. LLC v. SilencerCo, LLC</i>
1033	Exhibit C of Complaint in <i>HuxWrx Safety Co. LLC v. SilencerCo, LLC</i>

1034	HuxWrx Initial Infringement Contentions in <i>HuxWrx Safety Co. LLC v. SilencerCo, LLC</i>
1035	Amended Complaint in O.S.S. Holdings, LLC v. Thermal Defense Solutions, LLC

V. QUALIFICATIONS

23. My qualifications relevant to this IPR proceeding and Declaration are summarized in this section, with additional detail provided in my *curriculum vitae*, which is attached as EX1014, hereto.

24. I am originally from the United Kingdom, where I worked as a scientist/engineer for the UK Ministry of Defence, conducting weapons systems research, design, development, performance testing, reverse engineering, and forensics.

25. I have a First Class Honors Degree in Mechanical Engineering (recognized in the US under the terms of the Washington Accord) from the University of Greenwich, London, United Kingdom. I also have a Master's Degree in Business Administration from Henley Management College, Brunel University, London, United Kingdom. I completed a four-year engineering apprenticeship, and obtained additional specialized education and training in the area of firearms, firearm components/accessories, suppressors/silencers, ballistics, wound ballistics, and explosives at the UK Royal Military College of Science. I am registered as a professional engineer (EUR ING) in approximately thirty European nations.

26. I have been working in the area of firearms, firearm components/accessories, suppressors/silencers, ballistics, wound ballistics, and explosives for 38 years. I have extensive experience in weapons systems research, design, development, performance assessment, and system design evaluation. My work has included materials selection and manufacturing technique evaluation and specification, including as applied to sound moderators. From 1986 to 1999, I was employed by the United Kingdom Ministry of Defence. My positions included; from 1986 to 1990, I served as a project engineer, small arms; from 1990 to 1992, I served as a project manager, ammunition department; from 1992 to 1995, I served as a project manager, guns; and from 1995 to 1999, I served as a general/project manager, rocketry, missiles, pyrotechnics and explosives department; and as manager, legal services department (specializing in forensic firearms and ballistics).

27. During that time, my firearms and ballistics duties with the British Government included the following: (1) serving as an expert consultant/witness in over 200 legal cases; (2) designing gun components and accessories; (3) foreign weapon systems assessment including weapon systems reverse engineering, materials analysis, microscopic analysis, and comparison to NATO equivalents; (4) gun and component design optimization; (5) materials and process selection to optimize gun performance; and (6) testing of various gun mechanisms and ammunition for criminal trials.

28. Likewise, my ammunition duties at the Ministry of Defence included research, assessment, design, development and reverse engineering of ammunition components and complete rounds in calibers ranging from small arms to 120mm tank and 155mm artillery. I also provided forensic firearms and ballistics services to the United Kingdom criminal justice system and civil courts.
29. In addition to my experience detailed above, with respect to silencers and suppressors, my experience includes system design evaluation, instrumentation research and specification, testing and evaluation, and test data analysis and interpretation.
30. From 1996 to 2000, I was also a self-employed consultant, providing technical forensic and business advice to a variety of clients. From 2000 to 2004, I was employed as an adjunct professor at the Indiana Institute of Technology, lecturing in advanced courses in bachelor's degree programs. I am currently a consultant with Athena Research and Consulting, providing technical and forensic research and consulting.
31. I am a board-certified forensic engineering scientist via the International Board of Forensic Engineering Sciences (IBFES), which is accredited by the Forensic Specialties Accreditation Board (FSAB). I am a Fellow of the Institution of Mechanical Engineers, a Member of the National Society of Professional Engineers, a Fellow of the Chartered Management Institute, and a member of

several other technical and professional societies. In 2013, I was elected to Fellowship of the American Academy of Forensic Sciences (AAFS) and received achievement awards from AAFS in 2017 and 2022. I am an NRA certified pistol and personal protection instructor, and an NRA certified range safety officer. I have published numerous papers in the areas of firearms, firearm components/accessories, suppressors/silencers, ballistics, wound ballistics, and explosives, and have delivered training seminars to attorneys, students, investigators, law enforcement personnel, engineers and forensic scientists. I have conducted extensive engineering research on firearms, weapons systems, firearm components and accessories, and explosives, and have filed patents for innovations in munitions design. I have served as President of the Indiana Society of Professional Engineers, Section Chair in the American Academy of Forensic Sciences, and am a director of the Forensic Specialties Accreditation Board.

VI. LEGAL PRINCIPLES

32. I am not a legal expert and offer no opinions of the law. However, I have been informed by Petitioner's counsel that certain legal standards apply with respect to determining patentability. I recite my understanding of the relevant legal principles below.
33. I understand that, in this IPR proceeding, the challenge grounds set forth in the Petition include only allegations that the Challenged Claims are anticipated,

obvious, or both. I understand that a petitioner must demonstrate unpatentability via anticipation or obviousness by a preponderance of the evidence. I understand preponderance means more likely than not in this context.

A. Person Of Ordinary Skill In The Art

34. I understand that a POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. I further understand that factors to be considered in determining the level of ordinary skill in the art may include: (1) the types of problems encountered in the art, (2) the prior art solutions to those problems, (3) the rapidity with which innovations are made, (4) the sophistication of the technology, and (5) the educational level of active workers in the field.

B. Claim Construction

35. I understand that a purpose of claim construction is to determine what a person of ordinary skill in the art would have understood the claim terms to mean.

36. I understand that, under the *Phillips* claim construction standard, claim terms are to be given their ordinary and customary meaning as understood by a person of ordinary skill in the art in the context of the entire disclosure (*i.e.*, the patent claims, the patent specification, the patent drawings, and the prosecution history of record for the patent) at the time of the invention. I understand that one must be careful not to read a specific embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. I further

understand that any special definition for a claim term must be set forth with reasonable clarity, deliberateness, and precision.

37. I understand that this standard is the same as that used in United States district courts, in which claim terms are given their plain and ordinary meaning as would be understood by a person of ordinary skill in the art at the time of the invention having taken into consideration the language of the claims, the specification, and the prosecution history of record.

38. I further understand that the patent specification, under the legal principles, has been described as the single best guide to the meaning of a claim term, and is thus highly relevant to the interpretation of claim terms. I understand that for terms that do not have an ordinary and customary meaning within the art, the specification usually supplies the best context of understanding the meaning of those terms.

39. I further understand that other claims of the patent in question, both asserted and unasserted, can be valuable sources of information as to the meaning of a claim term. Because the claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims. Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.

40. I understand that the prosecution history can further inform the meaning of the claim language by demonstrating how the inventors understood the invention and whether the inventors limited the invention in the course of prosecution, making the claim scope narrower than it otherwise would be. Extrinsic evidence, such as dictionaries, may also be consulted in construing the claim terms.

C. Claim Interpretation

41. It is my understanding that certain claim terms have interpretations rooted in judicial decisions. For example, I understand that there is an exceptionally strong presumption that a claim term set off with 'consisting of' is closed to unrecited elements. I also understand that when the phrase like "at least one of" precedes a series of categories and the term "and" is used to separate the categories, a conjunctive list is connoted such that the phrase "at least one of" applies to each category of the list.

D. Prior Art

42. It is my understanding that a prerequisite to determining whether a reference or combination of references renders a claimed invention anticipated or obvious is determining the scope and content of the prior art and determining whether a given reference properly falls within that scope. Further, it is my understanding that a reference qualifies as prior art for an anticipation or obviousness determination only when it is analogous to the claimed invention. It is my

understanding that a reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention; or (2) the reference is reasonably pertinent to the particular problem solved by the inventor.

I understand that the field of endeavor of a patent is determined by looking to the patent itself — including the written description and claims and including the structure and function of the invention. I further understand that a reference is “reasonably pertinent” if it would logically commend itself to the inventor’s attention in considering the problem solved by the claimed invention.

43. I understand that a U.S. or foreign patent qualifies as prior art to a challenged patent if the date of issuance of the patent is prior to the invention of the challenged patent. I further understand that a U.S. or foreign patent also qualifies as prior art to a challenged patent if the date of issuance of the patent is more than one year before the filing date of the challenged patent. I also understand that a U.S. patent qualifies as prior art to a challenged patent if the application for that patent was filed in the United States before the invention of the challenged patent.

44. For purposes of my independent analysis, I have determined that all of the references cited in the challenge grounds in the Petition are prior art, as foreign or domestic patents in the relevant art that long predate the earliest claimed priority date. Although I disagree that the Patent Owner is entitled to their claimed priority

date, as detailed below, I have nevertheless used February 11, 2010, as the date of invention in my analyses.

E. Anticipation

45. I understand that during an IPR proceeding, the claims of a patent are to be given their ordinary and customary meaning as understood by a person of ordinary skill in the art at the time of the alleged invention in light of the claims, the specification of the patent, the prosecution history, and other relevant intrinsic and extrinsic information. I have been informed by counsel that in the anticipation inquiry, once the patent claims have been construed (if necessary), the claim language is compared to the prior art reference on a limitation-by-limitation basis.

46. I understand that a patent claim may be “anticipated” if each limitation of that claim is present either explicitly or inherently in a single prior art reference, and that the limitations should be arranged in the reference as in the claims. I understand that for a claimed limitation to be inherently present, the prior art reference need not expressly disclose the limitation, so long as the claimed limitation necessarily flows from a disclosure in the reference.

F. Obviousness

47. I understand that, in an IPR proceeding, a patent claim is deemed unpatentable if it is shown by a preponderance of the evidence that the claim is rendered obvious by one or more prior art references.

48. I have been informed that a claimed invention is unpatentable under 35 U.S.C.

§ 103 if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious to a POSITA at the time the invention was made. I have also been informed by counsel that the obviousness analysis takes into account factual inquiries including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

49. I have been informed by counsel that a patent claim is invalid as “obvious” under 35 U.S.C. § 103 in light of one or more prior art references if it would have been obvious to a POSITA, taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called “secondary considerations” of non-obviousness, which include: (i) “long felt need” for the claimed invention; (ii) commercial success attributable to the claimed invention; (iii) unexpected results of the claimed invention; and (iv) “copying” of the claimed invention by others. I understand that such evidence must have a nexus, or causal relationship to the limitations of a claim, in order to be relevant to the obviousness or non-obviousness of the claim.

50. I have been informed by counsel that a claim can be obvious in light of a single prior art reference or multiple prior art references, and that a claim is not obvious

if the reference or combined references do not disclose, teach or suggest at least one limitation of the claim.

51. I have been informed by counsel that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include the following: (a) combining prior art limitations according to known methods to yield predictable results; (b) simple substitution of one known limitation for another to obtain predictable results; (c) use of a known technique to improve a similar device (method, or product) in the same way; (d) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and/or (f) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

52. Dependent claims include all the limitations of the independent claim upon which they are based. Therefore, I understand that if a reference or combination of references fails to properly disclose, teach, or suggest a limitation of an independent claim, they also fail to do so when that limitation is deemed incorporated into all the dependent claims.

VII. THE '750 PATENT

A. Overview

53. I have reviewed and analyzed the '750 Patent. Below, I provide a brief overview of the same.

54. The specification and claims of the '750 Patent are generally directed to a device for suppressing or attenuating energy caused by rapid deflagration of propellants (controlled explosions) that generate expanding volumes of hot gases. Throughout this Declaration, I refer to these devices as “energy suppression device(s)” (ESD(s)). The ESD described in the '750 Patent includes a central chamber in fluid communication with an off-axis chamber, where the off-axis chamber includes a serpentine pathway that guides “fluid”¹ deflected from the central chamber through the off-axis chamber. The basic principle espoused in the '750 Patent is the use of a serpentine pathway in an off-axis chamber that causes fluid deflected from a central chamber to follow a circuitous path through the off-axis chamber before exiting the ESD. The general idea being: the longer the path, the more energy is dissipated by the ESD from the fluid, resulting in less noise generated by the fluid when it impacts the atmosphere.

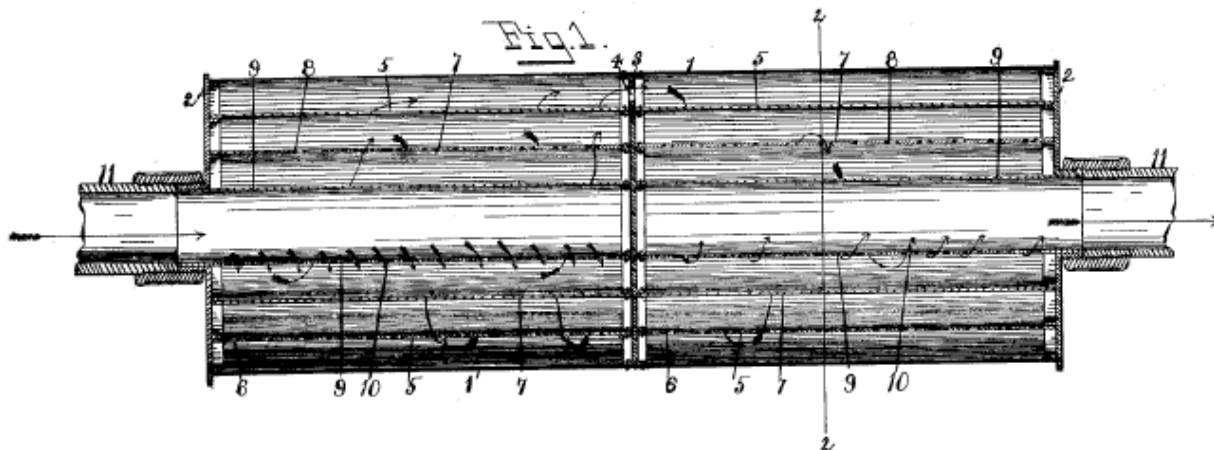
¹ Which, in the '750 Patent, includes gases, sound/shock waves, and/or particulates. See EX1001 at 4:24–26.

55. The ESDs described in the '750 Patent used to accomplish this basic concept are of a relatively rudimentary design — a design that has been around for nearly as long as ESDs themselves. One ESD design in the '750 Patent involves using a series of encapsulated tubes that are perforated at alternating ends to create a pathway (referred to in the '750 Patent as an “axially serpentine pathway”) that causes fluid to flow back (*i.e.*, backwards) and forth (*i.e.*, forwards) along the length of the ESD.
56. Another ESD design in the '750 Patent involves using concentric incomplete cylinders, the openings of which are offset to create a pathway (referred to in the '750 Patent as a “radially serpentine pathway”) that causes fluid to flow back (*i.e.*, counterclockwise) and forth (*i.e.*, clockwise) while advancing radially outwardly through progressively larger annular spaces formed by the concentric incomplete cylinders.
57. A third ESD design in the '750 Patent involves using longitudinal walls to form a series of longitudinal chambers that are distributed around a periphery of a central chamber and connected to one another at alternating ends to create a pathway that causes fluid to flow back (*i.e.*, backwards) and forth (*i.e.*, forwards) along the length of the ESD while advancing around the central chamber.

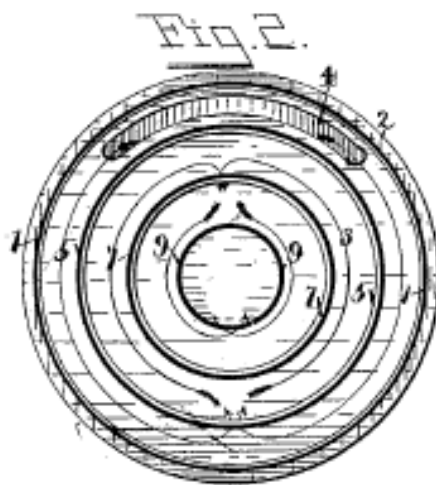
B. Relevant Technology

58. In addition to my existing knowledge of the technology related to the '750 Patent, in forming my opinions in this Declaration, I have researched additional technology related to the '750 Patent. Below, I provide a brief overview of technology that is related to the '750 Patent, and the knowledge a POSITA would have had at the time of the alleged invention of the '750 Patent.
59. ESDs were introduced in the late 1800s to suppress energy created by controlled explosions, such as those created by internal combustion engines and firearms. ESDs used to suppress and/or attenuate energy created by internal combustion engines are frequently referred to as “mufflers” whereas ESDs used to suppress and/or attenuate energy created by firearms are frequently referred to as “silencers” or “suppressors.”
60. The invention of the muffler is often attributed to Milton and Marshall Reeves, who obtained U.S. Patent No. 582,485, entitled “EXHAUST MUFFLER FOR ENGINES,” on May 11, 1897. The muffler disclosed in Reeves (EX1019) shares many similarities with the ESDs described in the '750 Patent. In Reeves, there are four concentric shells, each having alternatively positioned longitudinal rows of perforations. *See* EX1019 at 2:40-53. In Reeves, the fluids travel, in the first chamber, radially outward through the concentric shells reversing directions in the

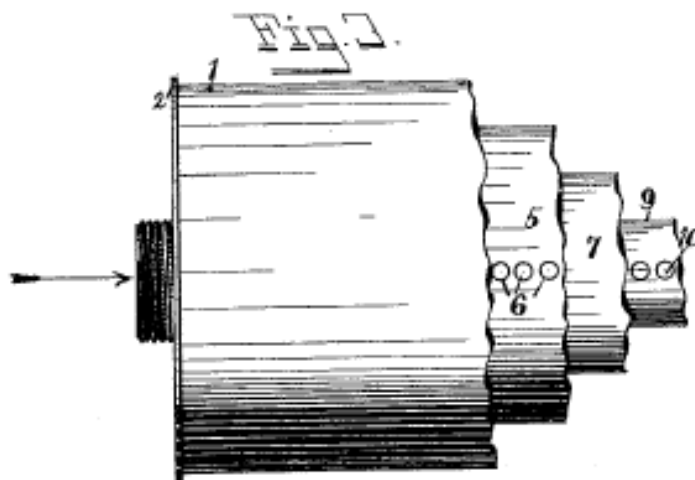
different concentric shells (*i.e.*, from clockwise to counterclockwise) and, in the second chamber, radially inward through the concentric shells. *Id.* at 2:59-75.



Id. at FIG. 1



Id. at FIG. 2



Id. at FIG. 3

61. Shortly after the Reeves brothers invented the muffler, Percy Maxim was working towards the invention of the silencer. Indeed, the invention of the silencer is often credited to Percy Maxim, who obtained U.S. Patent No. 916,885, entitled “SILENT FIREARM,” on March 30, 1909.

62. In general, the principles for suppressing energy created by internal combustion engines apply equally to the principles for suppressing energy created by firearms. Indeed, the technology in an ESD designed with a firearm in mind could often be used for an internal combustion engine (with no or minimal technical modifications, other than size/scale). To that end, Maxim himself obtained numerous patents for both mufflers and for suppressors. And, the similarities between the principles for suppressing energy created by internal combustion engines and firearms has since been recognized in many additional

publications, including in Barlowatz (EX1018 at p. 2) and in Werbell (EX1024 at 1:12-13).

63. Since the early invention of mufflers and silencers, numerous different ESD designs have been conceived and implemented. Indeed, in addition to the first muffler design, numerous additional designs for ESDs including a central chamber in fluid communication with an off-axis chamber have been implemented. *See e.g.* EX1015 at FIG. 1; EX1017 at FIG. 1; EX1019 at FIG. 1; EX1021 at FIG. 1; EX1022 at 1; EX1023 at 14; EX1024 at FIG. 1; EX1027 at FIGs. 1, 10, 14. The same is true for designs for ESDs having off-axis chambers that include serpentine fluid pathways, (whether they be axially, radially, or helically serpentine), a series of deflectors oriented along the axis of the central chamber, and end caps allowing the fluid to escape from the off-axis chamber. *See id.; see also, e.g.,* EX1008 at FIGs. 5-7; EX1009 at FIG. 1; EX1016 at FIG. 2; EX1025 at FIG. 1; EX1026 at FIGs. 1, 4, 5.

C. Person Of Ordinary Skill In the Art

64. I have considered the level of skill in the art as it pertains to the claimed invention as a whole and the accompanying specification. Also, in assessing the sophistication of the technology and educational level of workers in the field, I considered the educational background of former co-workers and colleagues, as

well as undergraduate students and graduate students, in relation to the invention of the '750 Patent and what the requisite skill set would have looked like.

65. Taking all the relevant factors into consideration (*see* Section VI(A), *supra*), it is my opinion that a person of ordinary skill in the art of the '750 Patent at the time of the alleged invention would have had a relevant technical degree in mechanical engineering, fluid mechanics, thermodynamics, physics, or the like, and 2-3 years of experience researching, designing, manufacturing, or assessing energy suppression devices, though less education may be sufficient with additional experience and vice versa.

66. For purposes of this Declaration, in general, and unless otherwise noted, my statements and opinions, such as those regarding my experience and the understanding of a POSITA generally (and specifically related to the references I consulted herein), reflect the knowledge that existed in the field as of the claimed priority date of the '750 Patent. Unless otherwise stated, when I provide my understanding and analysis below, it is consistent with the level of a POSITA prior to the claimed priority date of the '750 Patent, which I understand to be February 11, 2010.

D. The '750 Patent's Disclosure (EX1001)

67. I have reviewed the entirety of the '750 Patent, including the claims, the specification, and the drawings contained therein. Below is a brief summary of my review.

68. In its Background section, the '750 Patent discloses that “high energy sources can produce undesirable levels of acoustic noise and/or particulate pollution . . . [and that] in the case of firearms discharge, such acoustic noise can also provide information as to location of a shooter.” EX1001 at 1:13-19. The Background section goes on to describe, in the context of firearm sound suppression, alleged drawbacks of then-existing designs with regard to achieving “a long service life suppressor with low maintenance requirements and high acoustic suppression performance.” *Id.* at 1:20-52.

69. Under this backdrop, the '750 Patent discloses an ESD, where:

[t]he device can include a central chamber oriented along a central axis within an outer shell, said central chamber having an inlet configured to receive a high energy material from a high energy outlet. An off axis chamber can be oriented within the outer shell in fluid communication with the central chamber. The off axis chamber can have a fluid outlet and multiple internal walls to produce a serpentine fluid pathway which dissipates energy transferred from the high energy material. *Id.* at Abstract.

70. The '750 Patent discloses three ESDs in the illustrations and descriptions of FIGs. 1a and 1b, FIG. 14, and FIG. 16 as examples of such an ESD².

71. The '750 Patent first describes the first ESD 100 illustrated in FIGs. 1a and 1b (reproduced below), stating that:

[T]he energy capture and control device 100 can include a plurality of deflectors 165, 170, 175 arranged within the central chamber. The central chamber can be oriented along a central axis within an outer shell 110. The deflectors can be arranged to enable passage of a high energy material therethrough [sic] while redirecting at least a portion of gases, sound/shock waves, and/or particulates into the off axis chamber. *Id.* at 4:20-26.

The off axis chamber can include multiple internal walls 115, 120, 125, 130, 140, 145, 150, and/or 155 defining a serpentine or winding fluid pathway. The multiple internal walls can provide an increased volume for fluid expansion and increased acoustic absorbent path length. The fluid pathway can be[:]

an axially serpentine fluid pathway which causes fluids received in the off axis chamber to travel back and forth along a length of the off axis chamber.

. . . a radially serpentine fluid pathway which causes the fluids received in the off axis chamber to flow back and forth around a radius of the off axis chamber.

. . . a radially serpentine pathway which causes the fluids to flow back and forth around a radius of the off axis chamber while also traversing a length of the off axis chamber.

. . . a helical fluid pathway which causes the fluids to spiral around the central chamber within the off axis chamber along a length of the off axis chamber.

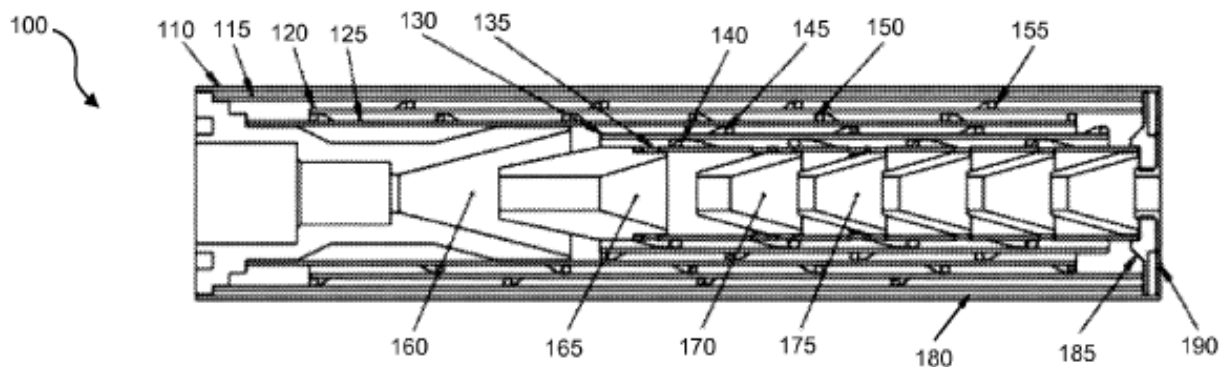
² While I use the term ESD throughout this Declaration, I note that the same is referred to as an energy capture and control device throughout the '750 Patent.

The various configurations can be integrated into various combinations as well to produce more complex flow paths. *Id.* at 4:27-45 (formatting mine).

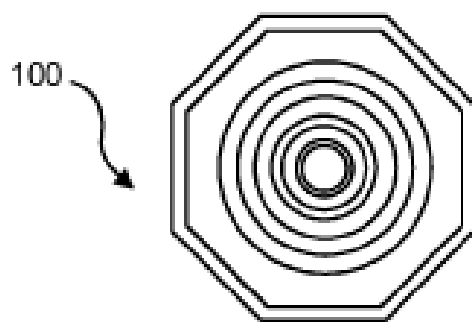
72. The '750 Patent further discloses:

FIG. 1a illustrates an example configuration where the internal walls define an axially serpentine fluid pathway which helically spirals around the central chamber along a length of the off axis chamber. More specifically, the off axis chamber is comprised of a plurality of tubes 115, 120, 125, 130, 135 of differing diameters nested within one another. In other words, the multiple internal walls can be formed by multiple concentric tubes having progressively larger diameters so as to form annular spaces between each adjacent tube. FIG. 1b is a cross-sectional side view of the device of FIG. 1a, illustrating tubes nested within an octagonally-shaped outer shell.

Adjacent tubes define a void therebetween through which gases can flow. Each tube can have at least one inlet from a successively smaller tube (or from a deflector or other structure) to allow fluids to flow from one tube to the next. For example, the inlet in one tube may comprise a hole near a first end of the tube and the same tube may have an outlet at an opposite end of the tube. Placing a hole near the ends of the tubes will force gases along a pathway through the tube due to pressure of the gases from the high energy device discharge. *Id.* at 4:60-5:13.

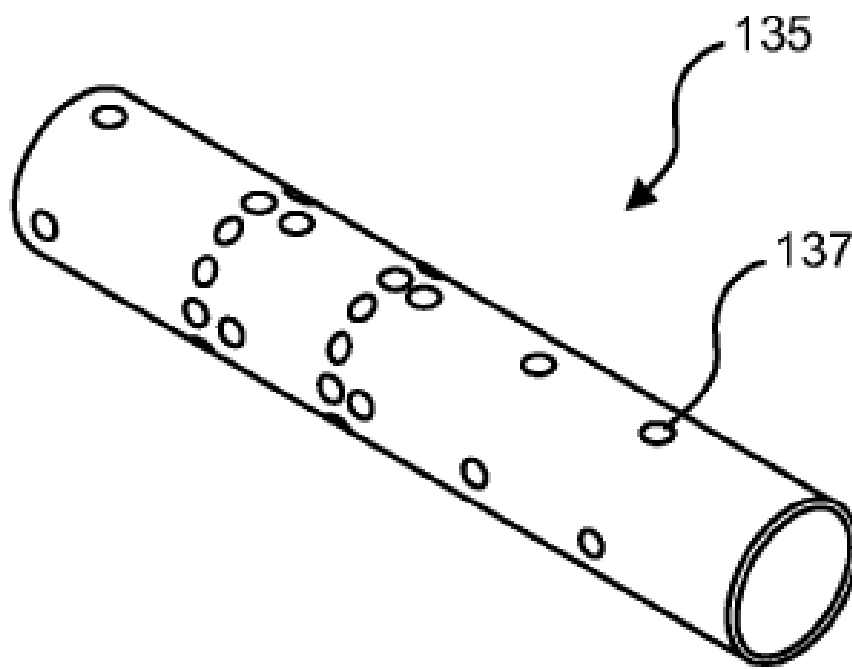


'750 Patent at FIG. 1a



'750 Patent at FIG. 1b

73. As described in the '750 Patent, “the off axis chamber can further include an annular dampening chamber 180 oriented about the central chamber and being filled with an energy absorbent material.” *Id.* at 6:30-32. Additionally, in the '750 Patent, “an innermost tube 135 in the off axis chamber can include orifices which correspond to the plurality of deflectors . . . [as] shown in FIG. 2.” *Id.* at 7:2-5 and FIG. 2 (see below).

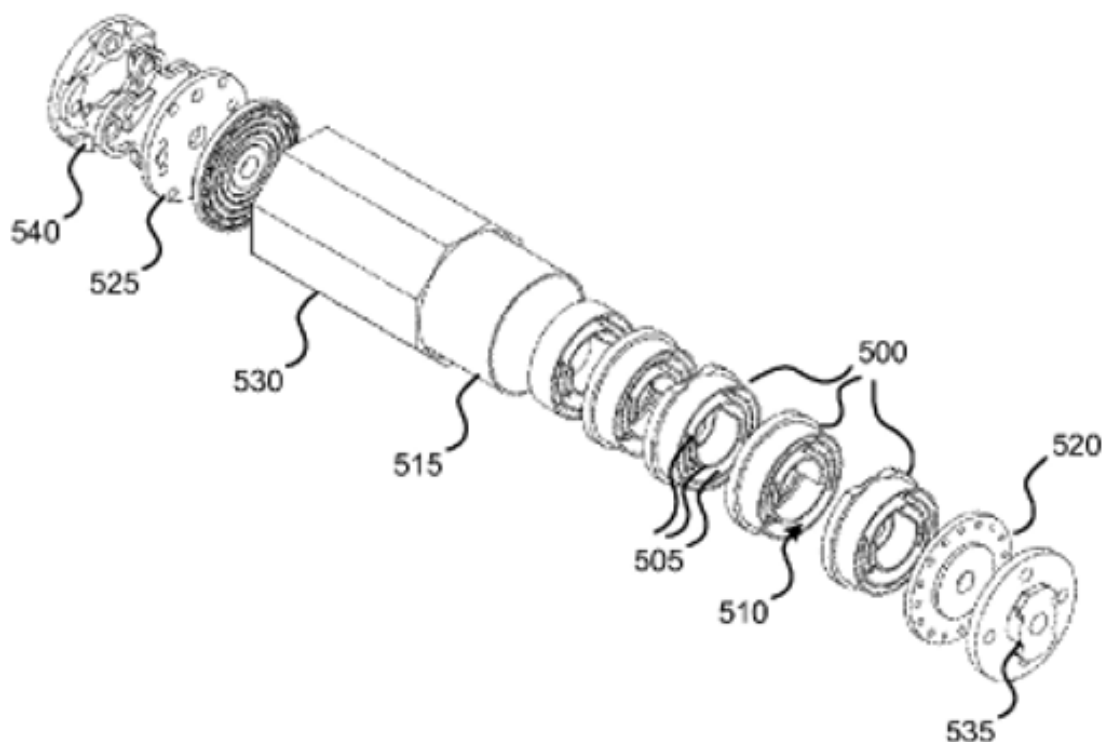


'750 Patent at FIG. 2

74. FIGs. 3a through 13 of the '750 Patent, and the description relating thereto, go on to illustrate and describe in more detail components and embodiments of the ESD design illustrated in FIG. 1a. *Id.* at 7:10-8:67 (*see* ECC device 100).

75. After discussing the components and embodiments of the ESD illustrated in FIG. 1a, the '750 Patent then describes the second ESD illustrated in FIG. 14 (*see* below), stating that:

Another alternative configuration for the internal walls to form the serpentine pathway can be concentric incomplete cylinders (*i.e.*, the cross section is an incomplete circle). The openings or gaps can form slits along the length of the cylinder. These gaps can be offset such that gases traveling therethrough are forced to pass through the annular space between each concentric cylinder. One example of such a configuration is shown in FIG. 14. In this configuration, the device includes multiple segments 500 which each have concentric offset cylinders 505. Gases flow into a serpentine path 510 created by the offset and spaced cylinders. The serpentine path in this case is a series of annular spaces which are connected and progressively larger. An outer shell 515 can enclose the assembly of segments and can include endpieces 520 and 525 to redirect gases which can optionally flow through the outer shell and external shell 530. *Id.* at 9:1-16.



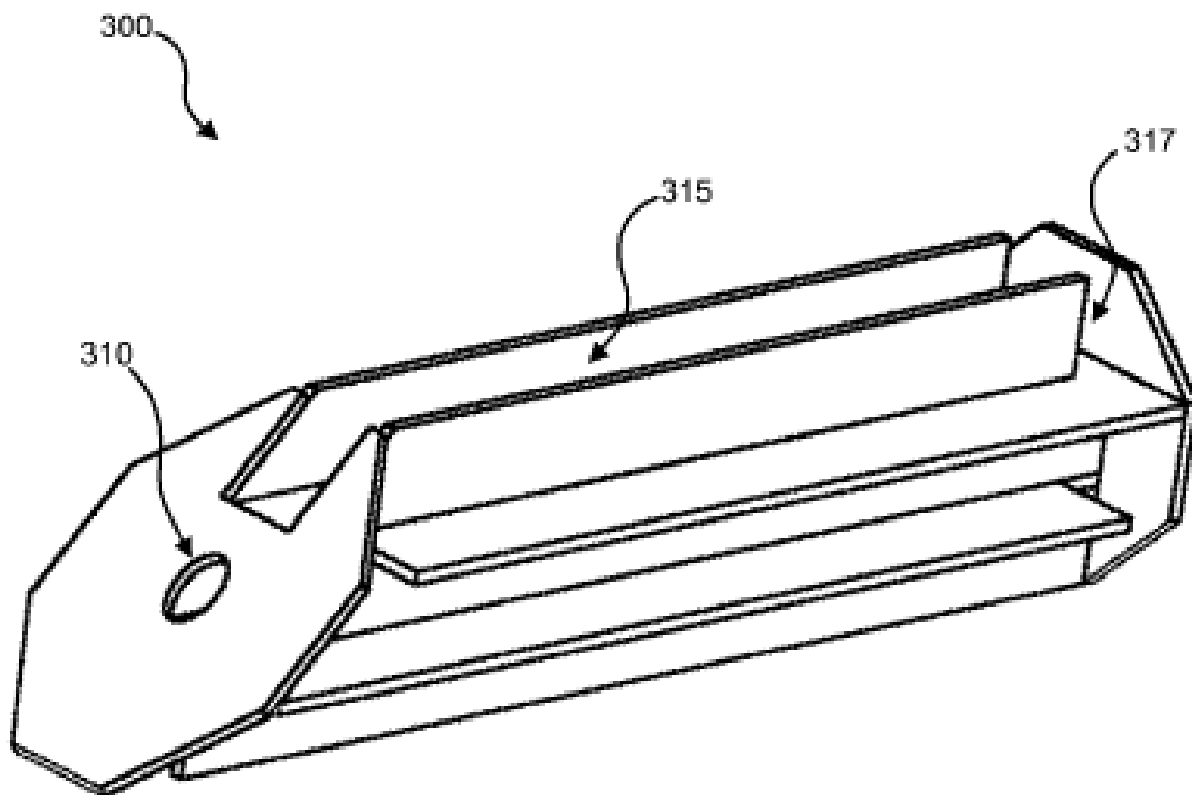
'750 Patent at FIG. 14

76. In an optional aspect of the '750 Patent, "a particulate modular attachment can be used to capture particulates from the high energy material as it exits the chamber[, which] . . . can be particularly useful in firearm applications where the high energy material is a bullet." *Id.* at 9:21-25.

77. Next, the '750 Patent describes the third ESD illustrated in FIG. 16 (see below), stating that:

[A]nother optional configuration for the multiple internal walls which form a plurality of longitudinal chambers. For purposes of illustration, the outer shell shown in previous figures is not shown. The longitudinal chambers can be each off set from the central axis and fluidly connected to [form]³ the axially serpentine fluid pathway. *Id.* at 9:50-55.

³ The '750 Patent appears to include a typo, using "from" instead of "form."



'750 Patent at FIG. 16

78. The '750 Patent concludes by asserting that:

Although the devices described are exemplified in terms of firearms, and more specifically in terms of silencer devices for sniper rifles used in counter-terrorism efforts, other applications can also benefit from these configurations. For example, high velocity/high temperature gases, projectiles, heat or sound energy can be suppressed using these devices. *Id.* at 10:22-27.

E. The '750 Patent's Priority Applications (EX1002 & EX1003)

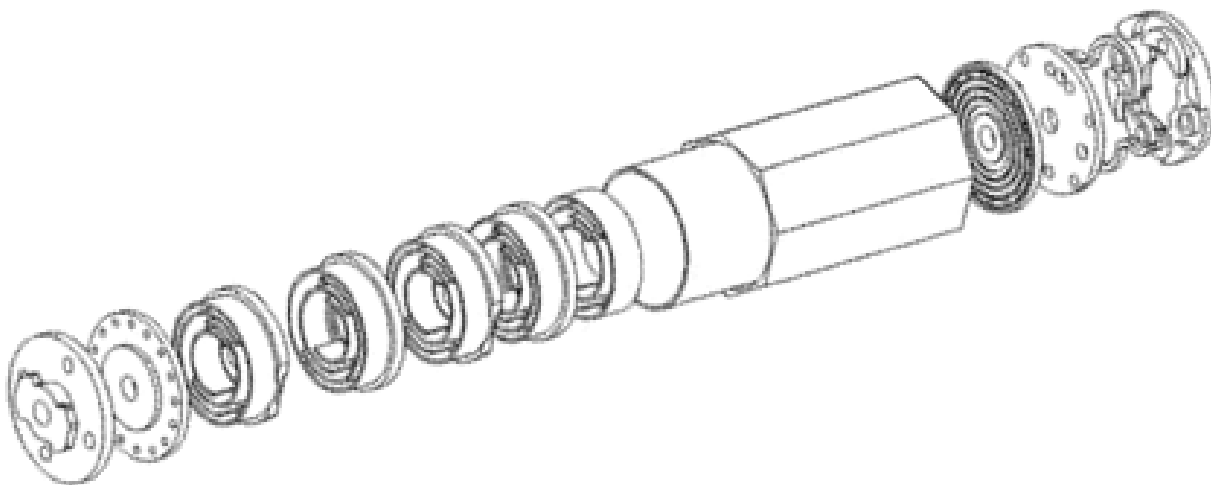
79. I have reviewed the provisional applications from which the '750 Patent claims priority. Below is a brief summary of my review.

80. As detailed on the face of the '750 Patent, it claims the benefit of U.S. Provisional Application No. 61/303,553 ("the '553 Provisional"), which was filed

on February 11, 2010 (*see* EX1002), and U.S. Provisional Application No. 61/418,285 (“the ’285 Provisional”), which was filed on November 30, 2010 (*see* EX1003).

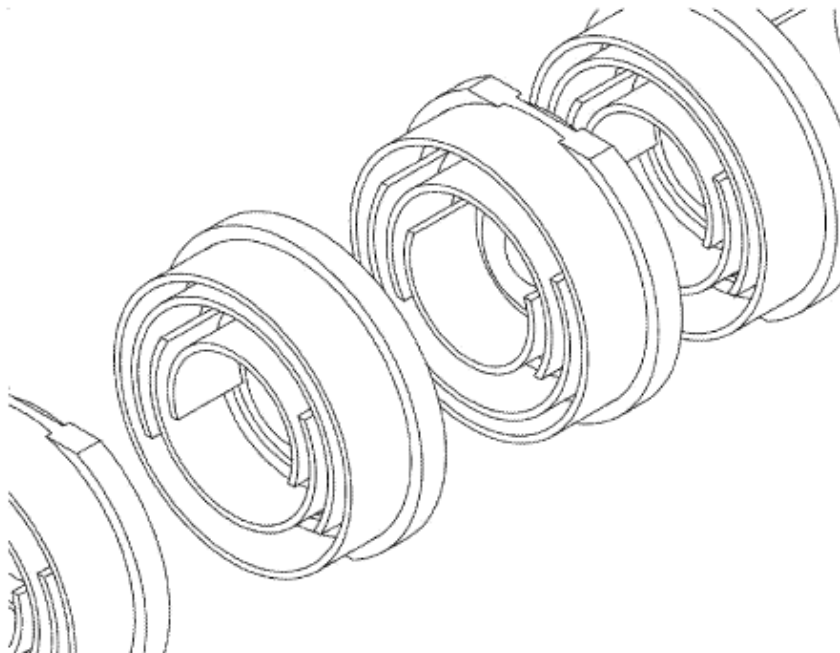
81. The ’553 Provisional contains figures that correspond to FIGs. 1a through 13, 15, and 16 of the ’750 Patent. I have identified no figure in the ’553 Provisional corresponding to FIG. 14 of the ’750 Patent. *See* EX1002 at FIGs. 1-17. Given this absence, I have identified no support in the ’553 Provisional for ESDs having an off-axis chamber including internal walls that form fluid pathways of the type illustrated in FIG. 14 and/or for radially serpentine fluid pathways.

82. The ’285 Provisional contains figures that correspond to FIG. 14 of the ’750 Patent. *See* EX1003 at FIGs. 1-5. I have identified that FIG. 1 of the ’285 Provisional (see below) closely corresponds to FIG. 14 of the ’750 Patent (see Section VII.A, *supra*).



’285 Provisional at FIG. 1

83. As seen below, FIG. 2 of the '285 Provisional provides an enlarged version of the segments 500⁴ of FIG. 14 of the '750 Patent (see Section VII.A, *supra*).



EX1003, FIG. 2

84. The '285 Provisional provides that:

A [sound reduction] module can include a shell having a central chamber oriented along a central axis, said central chamber having an inlet configured to receive a high energy material from a high energy outlet. Multiple off-axis chambers can be within the shell and can be concentrically and circumferentially interposed around the central chamber. The off-axis chambers can be in fluid communication with the central chamber. The off-axis chambers can include multiple internal walls, and can be defined by the multiple internal walls, the multiple internal walls [can] be operable for dissipating sound transferred from the high energy material radially outwardly from the central axis. *Id.* at p. 5 (see also EX1003 at p. 015).

85. More specifically, the '285 Provisional provides that:

⁴ Referred to as baffles in the '285 Provisional.

The off-axis chambers in each baffle can be in fluid communication with the central chamber along a majority of a length of the shell. The “chambers” described herein can refer to a space between one wall and another wall, whether the wall is an internal wall of the baffle, the shell outer wall, or some other wall. In one example, the plurality of off-axis chambers comprise complementarily opposing, off-set, concentric chambers defined by the internal walls. In another example, the internal walls are formed by multiple semi-circular walls having progressively larger diameters so as to form annular spaces between each adjacent wall, wherein each progressively larger diameter semi-circular wall is positioned opposite from each progressively smaller diameter semi-circular wall to achieve the concentrically and circumferentially interposed chambers within the shell. As used herein, the term “semi-circular” can refer to a partially circular shape and is not limited to a half-circular shape. Additionally, a semi-circular wall is a wall that has a semi-circular cross-section. As such, the semi-circular wall can be a cylindrical shape having a longitudinal gap along a length of the wall. *Id.* at p. 018.

The circumferentially interposed plurality of off-axis chambers can each include an inlet and an outlet and the plurality of off-axis chambers can be circumferentially interposed by offsetting the inlet of an individual chamber from the outlet of another individual chamber. In this way, the internal walls can define a laterally serpentine fluid pathway which dissipates sound, gases and particulates transferred from the high energy material. *Id.*

86. Accordingly, though I found support in the '285 Provisional for laterally serpentine fluid pathways in the context of a figure that closely corresponds to FIG. 14 of the '750 Patent, I found no explicit support in the '285 Provisional for radially serpentine fluid pathways.

87. Indeed, the first occurrence of the radially serpentine fluid pathway terminology I was able to find, though passing, was in the original specification and claims filed in U.S. Application No. 13/025,989 on February 11, 2011, from

which the '750 Patent issued — *i.e.*, only at page 7, lines 20-24 (*see* EX1004 at p. 252) and in original dependent claim 7⁵ (*see* EX1004 at p. 263).

F. The '750 Patent's Prosecution History (EX1004)

88. I have reviewed the prosecution history for the '750 Patent. Below is a brief summary of my review.

89. During prosecution of the '750 Patent, in its response to the Examiner's Non-Final Office Action dated September 30, 2011, the patent owner amended claim 1 to include "an off axis chamber . . . having a fluid outlet and multiple internal walls configured to produce a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine." *See* EX1004 at pp. 088, 090 (amendment markings in original) The patent owner likewise amended independent claim 17⁶. *Id.* In the same amendment, the patent owner also amended independent claim 20⁷ to include "a common off axis chamber comprising "a ~~winding~~ an axially serpentine fluid pathway and a fluid outlet." *Id.* at p. 91 (amendment markings in original).

90. In support of these amendments, the patent owner stated in its response to the Non-Final Office Action that, "each of the independent claims requires 'at least one of an axially serpentine and radially serpentine' fluid pathway," and stating

⁵ Corresponding to Claim 9 of the '750 Patent.

⁶ Corresponding to Claim 18 of the '750 Patent.

⁷ Corresponding to Claim 22 of the '750 Patent.

that for “radially serpentine flow . . . fluid would flow back and forth from clockwise to counter-clockwise around the axis as described in page 7, lines 20-22 and shown in Figure 14 (see units 500, 505 and 510) [of the original Application].” *Id.* at p. 93.

91. Lines 20-22 on page 7 of the as-filed specification⁸ state that a “radially serpentine fluid pathway . . . causes the fluids received in the off axis chamber to flow back and forth around a radius of the off axis chamber.” *See* EX1004 at p. 252. Lines 18 and 19 on page 14 of the as-filed specification (which are included within the description of Figure 14⁹) state that “the serpentine path in this case is a series of annular spaces which are connected and progressively larger.” *Id.* at 259. The '285 Provisional describes the fluid pathway formed by the ESD illustrated in FIG. 14 of the '750 Patent as a “laterally serpentine fluid pathway.” *See* EX1003 at p. 018.

92. In support of these amendments, the patent owner additionally stated that the “fluid outlet” in the off axis chamber “is a separate limitation from the fluid communication with the central chamber and presents an outlet for fluids to escape

⁸ Corresponding to lines 34 through 37 in column 4 of the '750 Patent. *See* '750 Patent at 4:34–37.

⁹ The description of Figure 14 can be found at lines 11 through 24 on page 14 of the specification as filed. *See* EX1002 at p. 259. And can be found at lines 1 through 20 in column 9 of the '750 Patent. *See* EX1001 at 9:1-20.

the off axis chamber and the device *without* returning to the central chamber.” *See* EX1004 at pp. 093, 094 (emphasis in original).

93. Additionally, in its response to the Non-Final Office Action, the patent owner added dependent claim 21¹⁰ and indicated that the “[n]ew claim 21 is drawn towards a device where fluid communication from the central chamber to the off axis chamber is limited to inlets at the first three deflectors rather than an entire length of the device (i.e. fourth and subsequent deflectors would be fluidly isolated from the off axis chamber).” *Id.* at p. 100.

94. After the Examiner was unpersuaded by its arguments as to the patentability of the amended claims submitted in its response to the Non-Final Office Action, the patent owner further amended, in its response to the subsequent Final Office Action dated February 8, 2012, independent claim 1 to include a “a common off axis chamber” and “c) a plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber.” EX1004 at p. 048 (amendment markings in original). The patent owner additionally amended dependent claim 16¹¹ to recite “an end cap assembly . . . [that] allows fluid to escape from the common off axis chamber through the fluid outlet, the fluid outlet being only

¹⁰ Corresponding to Claim 6 of the '750 Patent. *See* '750 Patent at Claim 6.

¹¹ Corresponding to Claim 18 of the '750 Patent. *See* '750 Patent at Claim 18.

accessible to the fluid in the common off axis chamber.” *Id.* at p. 50 (amendment markings in original).

95. The next action after patent owner's response to the Final Office Action was the Notice of Allowance dated June 12, 2012. *See* EX1004 at 031.

G. The Claimed Invention (Appendix A)

96. I have reviewed the claims of the '750 Patent. Below is a brief summary of my review.

97. The '750 Patent claims ESDs that, in addition to the following limitations, include a central chamber in fluid communication with a common off-axis chamber. *See generally*, EX1001 at Claims 1-22. In independent Claims 1 and 19, the common off axis chamber includes internal walls defining a serpentine fluid pathway that is at least one of axially serpentine and radially serpentine. *Id.* at Claims 1, 19. In independent Claim 22, the common off axis chamber includes internal walls defining a serpentine fluid pathway that is axially serpentine. *Id.* at Claim 22. Furthermore, in independent Claims 1 and 19, the claimed ESDs include multiple deflectors oriented in series along the central axis of the central chamber and that are each configured to deflect the energy from the high energy material to the common off axis chamber. *Id.* at Claims 1, 19. Claims 1 and 22 are reproduced below for reference:

1. An energy capture and control device, comprising:

a) a central chamber oriented along a central axis within an outer shell, said central chamber having an inlet configured to receive a high energy material from a high energy outlet;

b) a common off axis chamber oriented within the outer shell in fluid communication with the central chamber and having a fluid outlet and multiple internal walls defining a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine and which dissipates energy transferred from the high energy material; and

c) a plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber.

22. A method for energy capture and control from a high energy device, comprising:

a) discharging a high energy material from the high energy device through an energy capture and control device comprising a central chamber oriented along a central axis within an outer shell, said central chamber having an inlet configured to receive a high energy material from a high energy outlet, and a common off axis chamber oriented within the outer shell in fluid communication with the central chamber, the common off axis chamber comprising an axially serpentine fluid pathway and a fluid outlet; and

b) capturing energy within the common off axis chamber via a plurality of orifices from the central chamber using the axially serpentine fluid pathway, the energy being associated with discharge of the high energy material from the high energy discharge device.

VIII. CLAIM CONSTRUCTION

98. I understand from counsel that before the alleged prior art can be compared to the claims, the claim language must be properly construed to determine its scope and meaning such that the claim, as properly construed, can be compared to the alleged prior art to determine whether the claim is invalid as anticipated or obvious.

99. My methodology for determining the meaning of claim phrases was first to study the patent carefully. In particular, I studied the claims themselves, followed by the background, detailed specification, figures, and other patent content. Next, I reviewed the prosecution history looking for any clarifications or limitations that might be attached to claim terms. In some circumstances, I looked at other documents, such as analogous patent references that use the term “radial”, for example, U.S. Patent No. 5,136,923 (EX1028) and U.S. Patent No. 8,096,222 (EX1029).

100. In my opinion, the ordinary and customary meanings of the claim terms in the '750 Patent, in the context of the entire patent (including the patent specification, patent drawings, and the prosecution history), can be used for the purposes of determining invalidity of the '750 Patent claims.

A. The '750 Patent's Ordinary And Customary Meanings

101. For the sake of clarity, I explain the ordinary and customary meanings of the following claim limitations, as would have been understood by a POSITA at the time of the invention in light of the entire '750 Patent, in more detail below: (1) “a common off axis chamber;” (2) “a plurality of deflectors . . . configured to deflect the energy from the high energy material to the common off axis chamber;” (3) “a fluid outlet;” (4) “radially serpentine;” and (5) “a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine.”

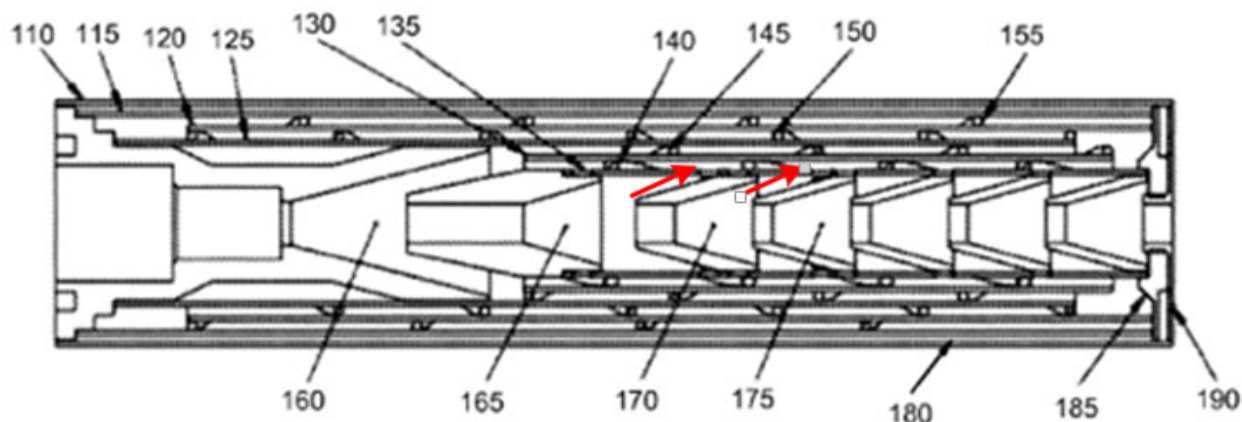
1. “a common off axis chamber”

102. Independent claim 1 recites “a common off axis chamber . . . in fluid communication with [a] central chamber.” As noted above, the “common” claim element was added to this limitation during the course of prosecution, and thus, as I understand it, is a limitation for which the patent owner is estopped from broadening.

103. Specifically, in its response to the Final Office Action, patent owner amended the independent claims to recite “a common off axis chamber.” EX1004 at p. 048. In support of the “common” amendment addition, the patent owner stated that “the off axis chamber is a ‘common’ off axis chamber into which a plurality of deflectors direct energy.” *Id.* at p. 54. The patent owner went on to represent that “the [claimed] off axis chamber spans and is connected to multiple deflectors.” *Id.*

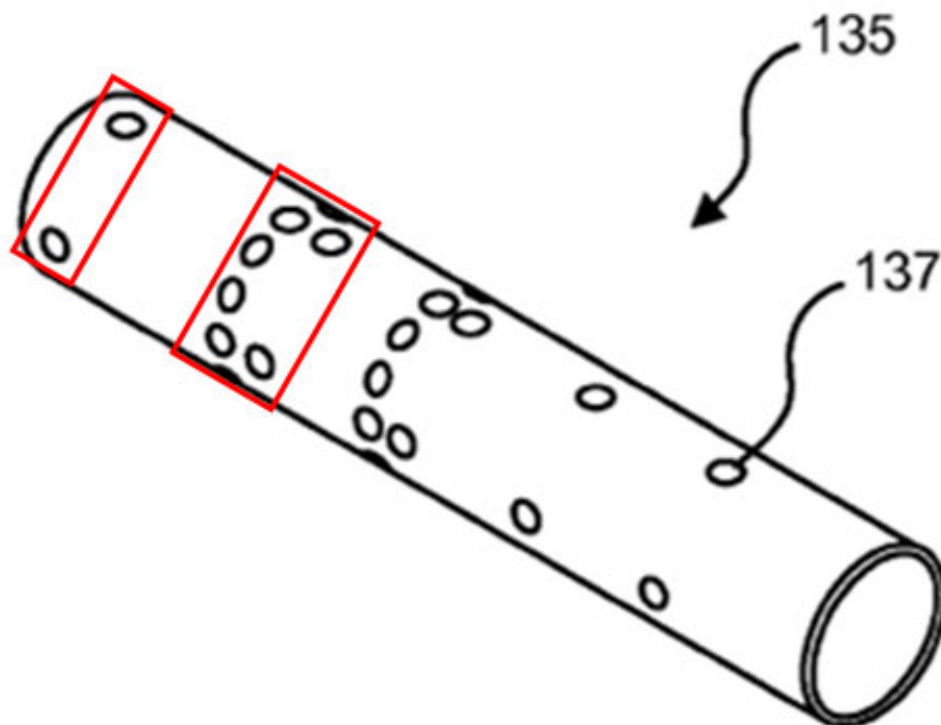
104. Given patent owner's explanation for this amendment, and considering the entire patent (including, the claims, the specification, and the prosecution history) and the knowledge of a POSITA, it is my opinion that the ordinary and customary meaning of “a common off axis chamber” is “an off axis chamber into which at least two deflectors separately and directly deflect energy transferred from a high energy material received by the central chamber.” In other words, a common off axis chamber excludes off axis chambers that are fluidly connected with a central chamber via a single fluid connection.

105. Put another way, in my opinion, to be a common off axis chamber, an off axis chamber must at least have (1) a first fluid connection that directly connects the off axis chamber to a first subchamber formed by multiple deflectors and (2) a second fluid connection that directly connects the off axis chamber to a second subchamber formed by multiple deflectors. *See* FIG. 1a of the '750 Patent (annotated below to show direct fluid communication with at least two separate subchambers formed by the multiple deflectors oriented in a central chamber).



'750 Patent at FIG. 1a (annotated)

106. As explained in the '750 Patent, this ordinary and customary meaning is supported by the specification. For example, in the '750 Patent, these separate fluid connections are formed by orifices 137 in the innermost tube 135. *See* FIG. 2 of the '750 Patent below with annotations showing the separate fluid connections corresponding to the fluid communication illustrated above.



'750 Patent at FIG. 2

2. “a plurality of deflectors . . . configured to deflect the energy from the high energy material to the common off axis chamber”

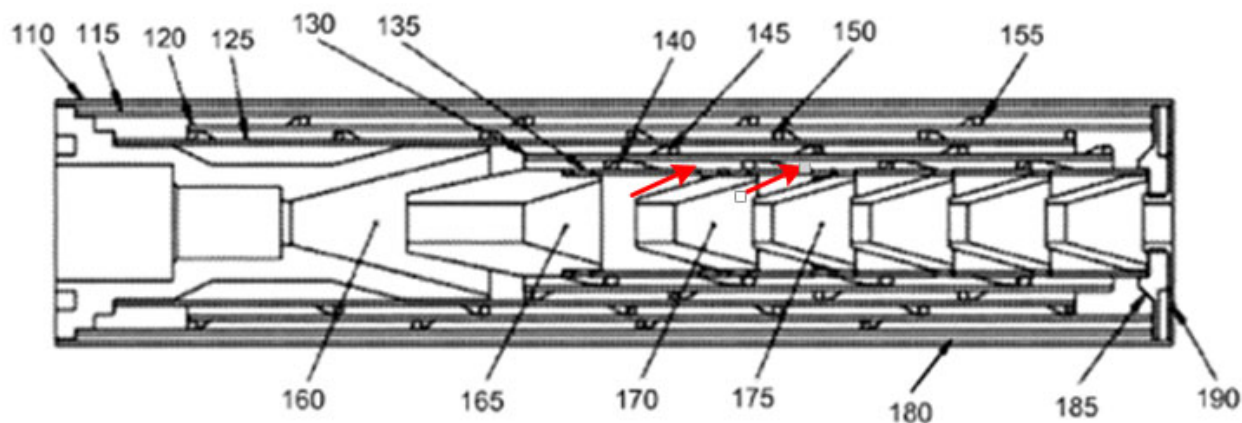
107. Independent claim 1 recites “a plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber.”

108. As noted above, in my opinion, a “common off axis chamber” is an off-axis chamber into which at least two deflectors separately and directly deflect energy transferred from a high energy material received by the central chamber.

109. Applying that ordinary and customary meaning, and considering the entire patent, patent prosecution history and the knowledge of a POSITA, it is my opinion that the ordinary and customary meaning of “a plurality of deflectors . . .

configured to deflect the energy from the high energy material to the common off axis chamber” is “at least two deflectors each configured to deflect energy from a high energy material to the common off axis chamber via respective separate and direct fluid connections.”

110. This meaning is supported by the '750 Patent. Specifically, the annotations to FIG. 1a of the '750 Patent below show an example where the multiple deflectors include two deflectors in the central chamber and each have direct fluid connections to the common off axis chamber. As such, in my opinion, an interpretation allowing one of the multiple deflectors to directly deflect energy to the common off axis chamber would be at conflict with the definition of a “common off axis chamber,” which requires energy to be directly received from at least two deflectors.



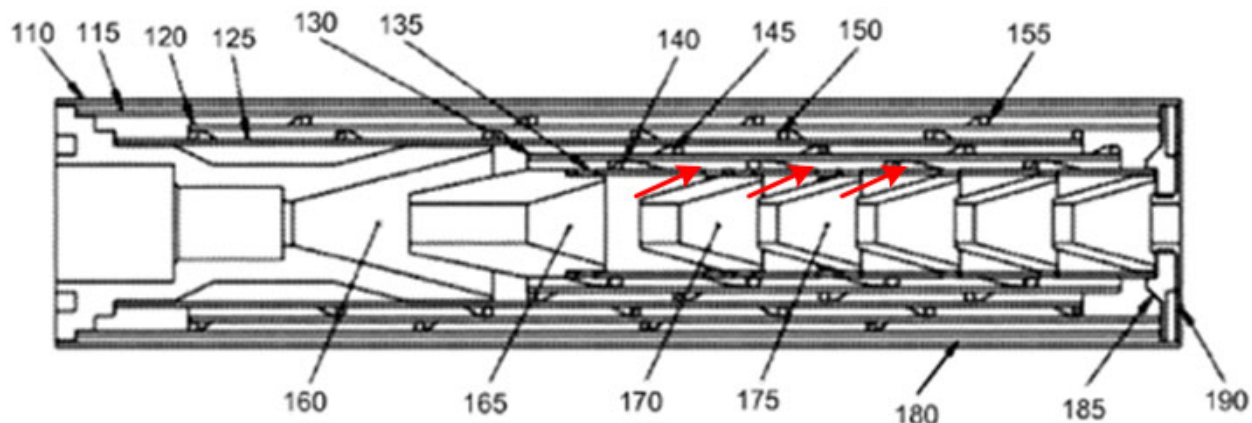
'750 Patent at FIG. 1a (annotated)

111. The patent owner's statements during prosecution of the '750 Patent lend further support to my understanding of the ordinary and customary meaning of

this term. For example, during prosecution, patent owner added “[n]ew claim 21¹² [] drawn towards a device where fluid communication from the central chamber to the off axis chamber is limited to inlets at the first three deflectors rather than an entire length of the device (i.e. fourth and subsequent deflectors would be fluidly isolated from the off axis chamber).” EX1004 at p. 100.

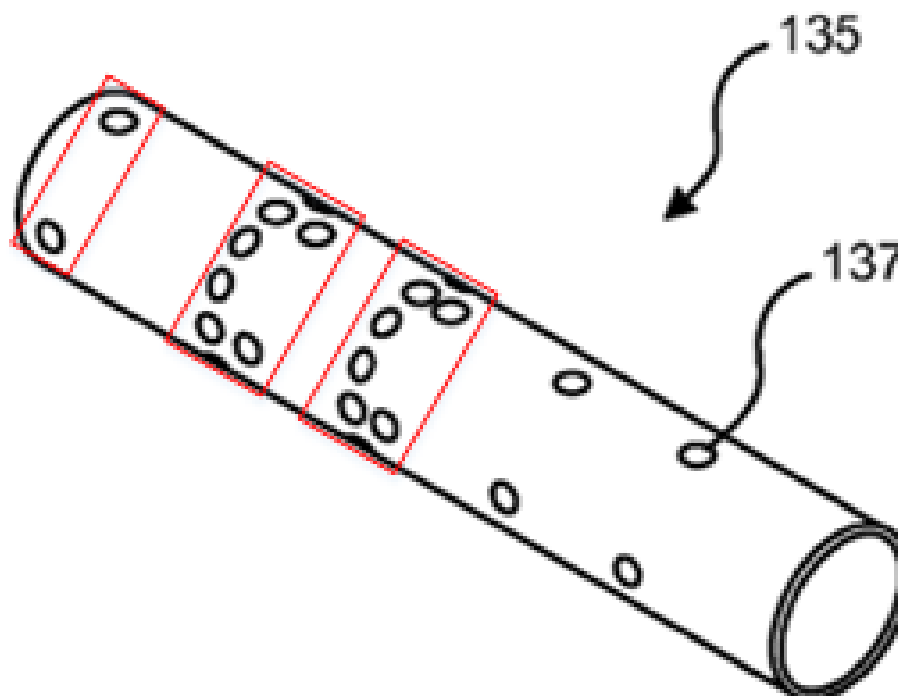
112. Thus, the phrase “the fluid communication . . . occur[ing] only at the primary deflector, the secondary deflector, and a first tertiary deflector [of one or more tertiary deflectors]” in dependent Claim 6 of the ’750 Patent requires that the first three sub-chambers, and only the first three sub-chambers, formed by the first three deflectors (in some examples, of a larger set of (e.g., five) deflectors) be directly connected to the common off axis chamber via respective fluid connections. *See* FIG. 1a of the ’750 (annotated to show direct fluid communication with three separate sub-chambers formed by the first three deflectors oriented in a central chamber). In other words, dependent Claim 6 covers a case where less than all of the deflectors in the central chamber directly deflect energy into to the common off axis chamber.

¹² Corresponding to Claim 6 of the ’750 Patent.



'750 Patent at FIG. 1a (annotated)

113. In the '750 Patent, these three separate fluid connections are formed by orifices 137 in the innermost tube 135. *See* FIG. 2. of the '750 Patent (annotated to show the separate fluid connections to the three deflectors corresponding to the fluid communication illustrated above).



'750 Patent at FIG. 2

114. As such, it is my opinion that a POSITA would understand the phrase “a plurality of deflectors . . . configured to deflect the energy from the high energy material to the common off axis chamber” in independent Claim 1 to require each of “the plurality of deflectors” in independent Claim 1 to directly deflect energy from a high energy material to the common off axis chamber via respective direct fluid connections.

3. “a fluid outlet”

115. Independent claim 1 recites “a common off axis chamber . . . having a fluid outlet.”

116. During prosecution, the patent owner stated that the “fluid outlet” in the off axis chamber “is a separate limitation from the fluid communication with the central chamber and presents an outlet for fluids to escape the off axis chamber and the device *without* returning to the central chamber.” EX1004 at pp. 093, 094 (emphasis in original). In my opinion, this definition is overly restrictive and does not find support in the '750 Patent. Indeed, the term “fluid outlet” appears only twice in the '750 Patent's specification (at line 16 of column 4 and at line 28 of column 9) and in neither of these instances does the specification describe a fluid outlet in this way. In fact, patent owner's subsequent actions in response to the Final Office Action — amending dependent claim 16¹³ (which depended from

¹³ Corresponding to Claim 18 of the '750 Patent.

independent claim 1) to explicitly limit the “fluid outlet [to] being only accessible to the fluid in the common off axis chamber” — provide further support that patent owner's previously proffered definition of “a fluid outlet” was unsupported and erroneous. EX1004 at p. 050.

117. As such, considering the entire patent and the knowledge of a POSITA, it is my opinion that the ordinary and customary meaning of “a fluid outlet” is “an orifice through which gas flows out of the common off axis chamber.”

4. “a serpentine fluid pathway which is . . . radially serpentine”

118. Independent claim 1 recites “a serpentine fluid pathway which is . . . radially serpentine.”

119. I understand that in the related lawsuit patent owner filed against Petitioner in the United States District Court for the District of Utah, patent owner has taken the position that the ordinary and customary meaning of a “radially serpentine” fluid pathway is a merely a pathway that causes fluid to change direction (*e.g.*, from clockwise to counterclockwise). *See* EX1033 at p. 4. I further understand that patent owner has set forth that a “radially serpentine” fluid pathway requires a single change of direction. *See* EX1034 at p. 4. In my opinion, patent owner's definition is at odds with the text of the '750 Patent (including the express definition of “radially serpentine” set forth in the specification), patent owner's

representations in the prosecution history, and the ordinary and customary meaning of “back and forth”.

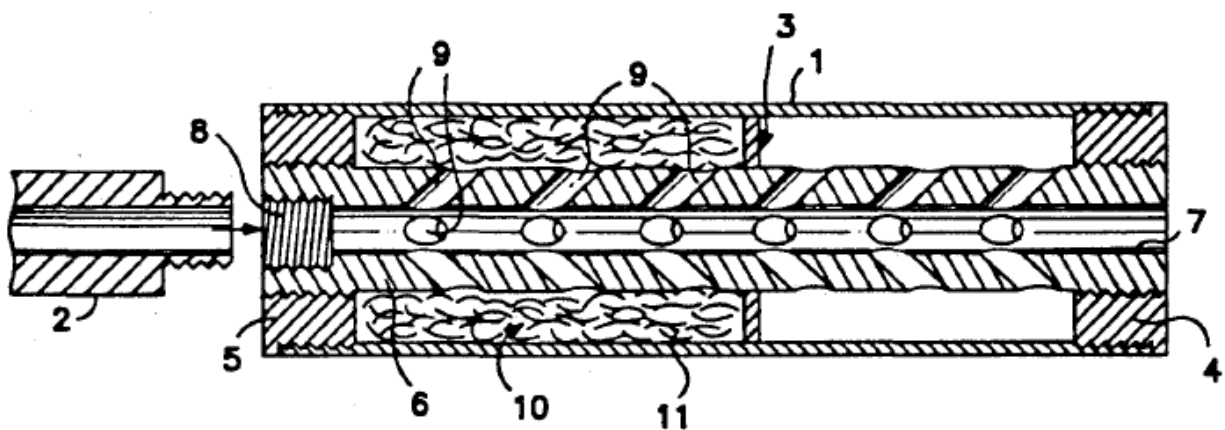
120. As detailed above, the '750 Patent identifies three categories of fluid pathways: (1) axially serpentine; (2) radially serpentine; and (3) helical. EX1001 at p. 4:27-45. The '750 Patent explicitly identifies the ESD of FIG. 1a as having a fluid pathway that is both axially serpentine and helical. *Id.* (“FIG. 1a illustrates an example configuration where the internal walls define an axially serpentine fluid pathway which helically spirals around the central chamber”). The '750 Patent also explicitly identifies the ESD of FIG. 16 as having a fluid pathway that is axially serpentine. *Id.* at 9:50-55 (“The longitudinal chambers include can be each off set from the central axis and fluidly connected to [form] the axially serpentine fluid pathway”).

121. Separate from these disclosures as to axially serpentine and helical flow paths, the '750 Patent provides that a “radially serpentine fluid pathway . . . causes the fluids received in the off axis chamber to flow back and forth around a radius of the off axis chamber.” *Id.* at 4:34-37.

122. The first three definitions of “radial” in Webster’s dictionary are (1) “arranged or having parts arranged like rays” (2) (a) “relating to, place like, or moving along a radius” or (b) “characterized by divergence from a center;” and (3) “of, relating to, or adjacent to a bodily radius.” Accordingly, in my opinion, a POSITA would

understand, at the time of the invention, that a “radial” fluid pathway refers to a fluid pathway that extends from the center to an exterior of an object.

123. As support for this position, I refer to the analogous prior art reference, U.S. Patent No. 5,136,923 to Walsh (EX1028), which issued on August 11, 1992, and which provides an alternative definition “radial” as “simply transverse to the axis of the interior tube, but not necessarily normal to that axis” and which depicts, in FIG. 1 reproduced below) such radial projections 9 extending from a central chamber to an outer chamber of the ESD describe in Walsh. EX1028 at 2:51-53 and FIG. 1. Here, Walsh diverges from the standard definition of radial, which would require the radial projections 9 to extend normal to the axis extending through the length of Walsh’s ESD.

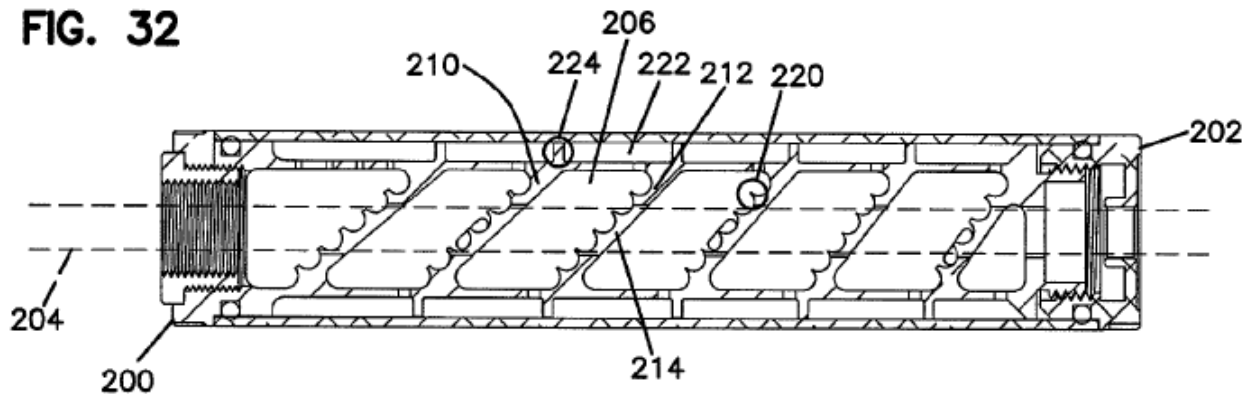


Id. at FIG. 1

124. I also refer to the analogous prior art reference, U.S. Patent No. 8,096,222 to Silvers (EX1029), which has an effective filing date of August 26, 2005 and

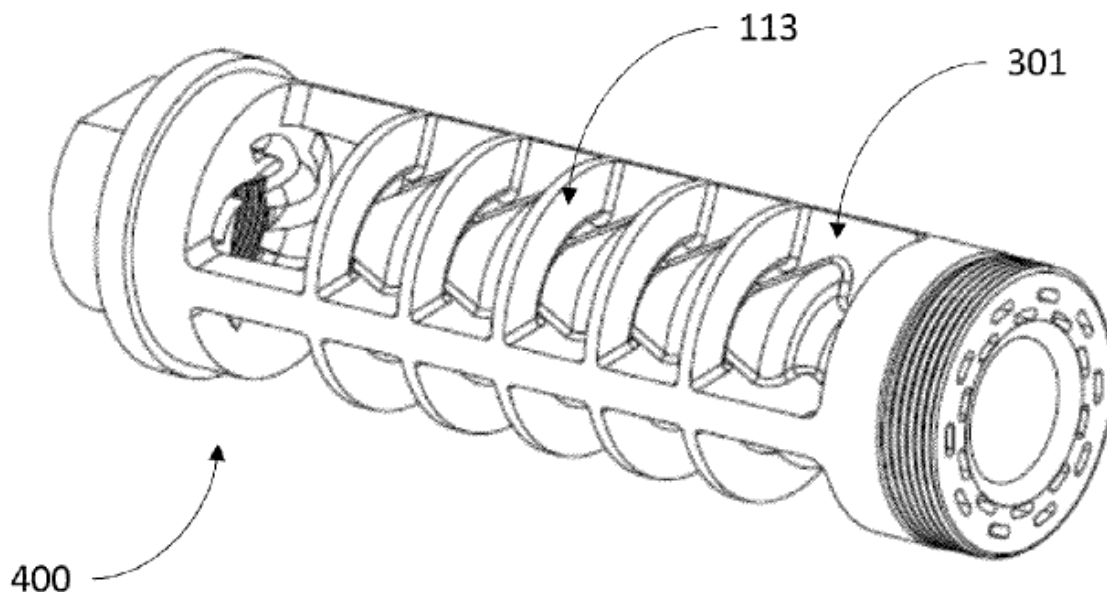
describes the wall 224 in FIG. 32 (reproduced below) as extending in a “radial” direction. EX1029 at 16:19-17:21 and FIG. 32. Here, as expected, Silver’s radial wall 224 extends normal to the axis extending through the length of Silver’s ESD.

FIG. 32



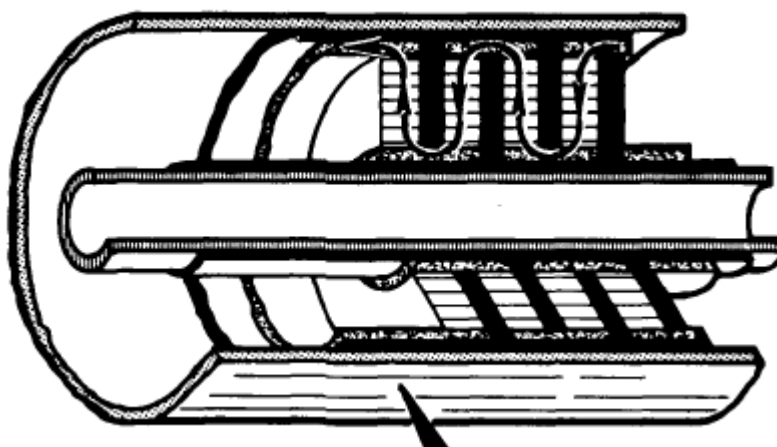
Id. at FIG. 32

125. I additionally refer to the document, U.S. Patent No. 9,347,727 to Cler (EX1030), which was filed on April 29, 2014, and illustrates longitudinal ribs 301 that divide the bypass chamber 103 and possibly a portion of the primary chamber “radially.” EX1030 at 8:22-24 and FIG. 4a. As depicted in FIG. 4a of Cler, the longitudinal ribs 301 that extend longitudinally and outward, radially, from a center of Cler’s ESD. *Id.* at FIG. 4a. I further note that, in using the term “radially,” Cler explicitly references the ’750 Patent and the “radially serpentine” fluid pathway therein (*Id.* at 2:54-63), further supporting my position that one skilled in the art would understand a “radially serpentine” fluid pathway in the ’750 Patent as extending outwardly from a center to an exterior of an ESD.



Id. at FIG. 4a

126. I additionally refer to the NASA document “Compact Thermoelectric Converter Systems Technology Final Report” which was published in June 1973, and defines a “radially serpentine” current path as one that travels toward a center and away from a center while advancing axially through an off axis chamber. EX1031 at xxii-xxiii.



Id. at xxiii

127. Thus, in my opinion, a POSITA reading lines 34-37 in column 4 of the '750 Patent would understand a “radially serpentine fluid pathway” as a fluid pathway that winds back and forth around a radius that extends outwardly from a central point to an exterior of the '750 Patent's ESD and is normal to the axis extending through the length of the '750 Patent's ESD. *See* Figure 1 below.

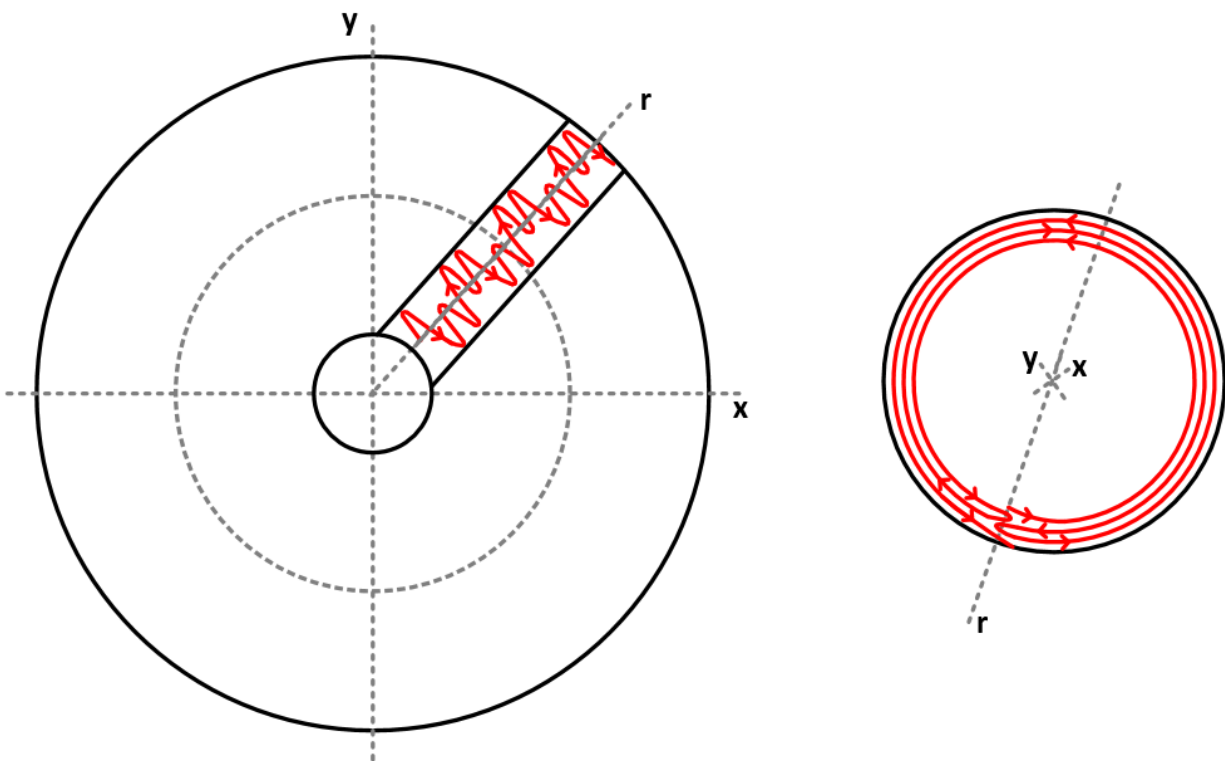
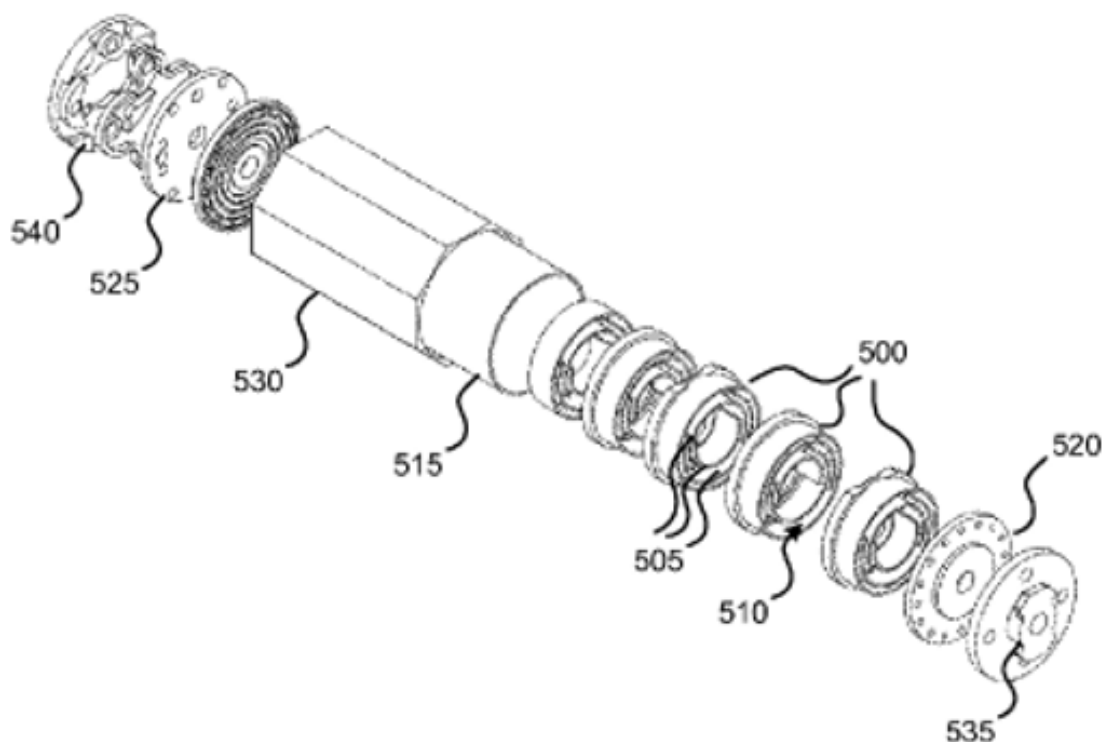


Figure 1

128. In the '750 Patent's prosecution history, the patent owner explicitly references FIG. 14 (see below) as illustrating a radially serpentine fluid pathway. EX1004 at p. 259. The '750 Patent identifies the ESD of FIG. 14 as having a serpentine path that “is a series of annular spaces which are connected and progressively larger”

created by offset and spaced cylinders 505. EX1001 at 9:11-13. In other words, the radially serpentine fluid pathway illustrated in FIG. 14 is a pathway that serpentine back (*i.e.*, counterclockwise) and forth (*i.e.*, clockwise) while advancing radially outward through a series of annular spaces that are connected and progressively larger. *See* Figure 2 below.



'750 Patent at FIG. 14

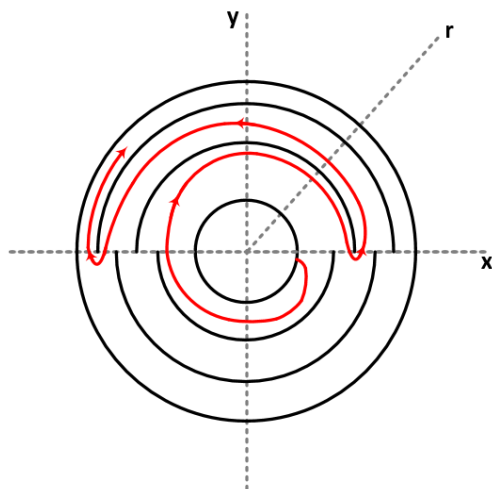


Figure 2

129. During the prosecution of the '750 Patent, patent owner also identified a radially serpentine pathway as a pathway that would cause fluid to “flow back and forth from clockwise to counter-clockwise around the axis as described in page 7, lines 20-22.” It is unclear from the Non-Final Office Action response what “the axis” in “around the axis” refers to. EX1004 at p. 259. However, considering that the section (page 7, lines 20-22) referenced by patent owner explicitly provides that a “radially serpentine fluid pathway . . . causes the fluids received in the off axis chamber to flow back and forth around a radius of the off axis chamber,” (EX1004 at p. 259) I believe that the use of “the axis” was a misrepresentation, as there is no support in the '750 Patent or related applications for a “radially serpentine” fluid pathway to flow back and forth around an **axis** as opposed to a **radius**.

130. Moreover, in my opinion, “back and forth” movement requires at least two changes in direction. That is, to come “back,” an object must first go forth.

131. As such, and considering the entire patent and the knowledge of a POSITA, it is my opinion that a POSITA at the time of the invention would understand that the ordinary and customary meaning of “a serpentine fluid pathway which is . . . radially serpentine” to be “a fluid pathway that causes fluids to flow back (*e.g.*, counterclockwise) and forth (*e.g.*, clockwise), changing directions at least twice, while advancing outwardly along a radius of the off-axis chamber.

5. “a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine”

132. Independent claim 1 recites “a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine.”

133. I understand from counsel that, under *SuperGuide*¹⁴, when “[t]he phrase ‘at least one of’ precedes a series of categories of criteria, and . . . the term ‘and’ [is used] to separate the categories of criteria,” “a conjunctive list” is connoted such that “at least one of” is applied to each member in the list — *e.g.*, at least one of A, at least one of B, etc.

134. In the ’750 Patent, the phrase “at least one of” precedes a list of fluid pathways including an “axially serpentine fluid pathway” and a “radially serpentine fluid

¹⁴ *SuperGuide Corp. v. DirecTV Enters.*, 358 F.3d 870, 886 (Fed. Cir. 2004).

pathway.” In my opinion, the members of the list of fluid pathways describe categories of fluid pathways. Specifically, “fluid pathways [that cause fluid flow] having an oscillating velocity vector along the axial direction” can be categorized as “axially serpentine fluid pathways.” *See* EX1004 at p. 094 (patent owner stating in its response to the Non-Final Office Action that, “[f]rom a mathematical perspective, this would be described by an oscillating velocity vector along the axial direction”). And fluid pathways that cause fluids to flow clockwise and counterclockwise while advancing outwardly along a radius of the off-axis chamber can be categorized as “radially serpentine fluid pathways.” *See* EX1004 at p. 259.

135. Applying the *SuperGuide* case, as understood by me through counsel, it is my opinion that the ordinary and customary meaning a POSITA at the time of the invention would give “a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine” would be “a fluid pathway that is both axially serpentine and radially serpentine.”

IX. THE APPLIED PRIOR ART REFERENCES

A. The '750 Patent's Effective Filing Date

136. As noted above, the first support I identified for FIG. 14 of the '750 Patent was introduced in the '285 Provisional filed on November 30, 2010. Also, the first support I identified for the “radially serpentine” language was introduced in the

original specification filed in U.S. Application No. 13/025,989 on February 11, 2011, (ultimately issuing as the '750 Patent). *See* EX1004 at pp. 252, 263. As such, it is my opinion that the '750 Patent is not entitled to an effective filing date of the earliest filed '553 Provisional, filed on February 11, 2010. Instead, it is my opinion that the '750 Patent is entitled to an earliest effective filing date that is commensurate with the filing date of the '750 Patent--February 11, 2011.

B. Applied Prior Art References

137. Regardless of the effective filing date assigned to the '750 Patent (the latest effective filing date being on February 11, 2011), I have been informed that pre-AIA law applies. I understand that the following foreign and domestic patents and printed publications qualify as prior art to the '750 Patent under 35 U.S.C. § 102 (pre-AIA) and apply the same in this Declaration.

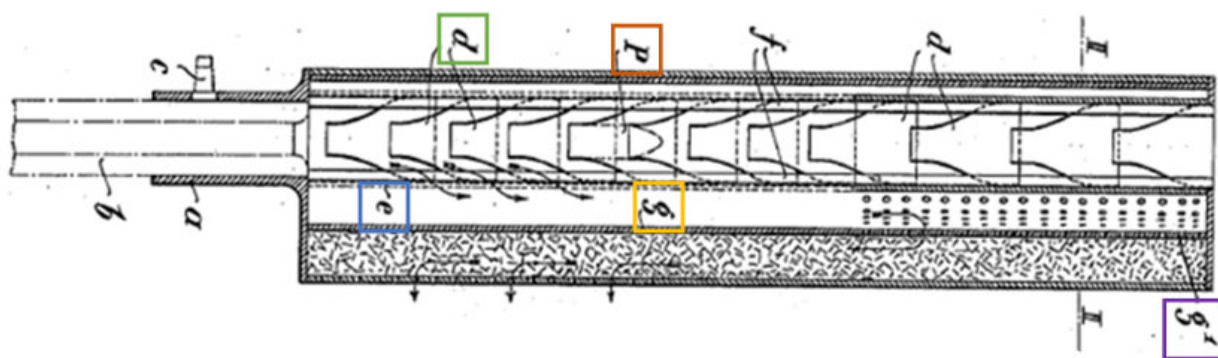
PRIOR ART REFERENCES					
Exhibit	Name	Pat./Publ. No.	Published	Filed	§ 102
EX1015	Thurler	US 1,000,702	08/15/1911	11/02/1910	(a), (b), (e)
EX1016	Bouton	US 748,157	12/29/1903	04/03/1903	(a), (b), (e)
EX1017 (EX1018)	Barlowatz (translation)	FR 493,462	08/09/1919	05/09/1917	(a), (b)
EX1019	Reeves	US 582,485	05811/1897	01/11/1897	(a), (b), (e)
EX1020 (EX1021)	Eichenseher (translation)	DE 305,012	01/07/1920	01/09/1917	(a), (b)

1. *Thurler (EX1015)*

138. U.S. Application No. 590,367 ("Thurler") was filed on November 2, 1910, and issued as U.S. Patent No. 1,000,702 on August 15, 1911. EX1015 at p. 2.

Thus, I understand that Thurler qualifies as prior art under 35 U.S.C. § 102(a), (b), and (e).

139. Thurler discloses “devices for lessening the report of firearms.” EX1015 at 2:9-10. Thurler’s FIGs. 1 through 4 disclose one such device made according to Thurler. *Id.* at 2:40-45. Thurler’s FIG. 1 (see below) “represents a horizontal longitudinal section” of the device. *Id.* at 2:40-41.



EX1015 at FIG. 1 (annotated)

140. Thurler’s FIG. 2 (see below) “shows a cross section along the line II — II (see FIG. 1).” *Id.* at 2:41-43.



EX1015 at FIG. 2 (annotated)

141. Thurler describes the device illustrated in FIGs. 1 and 2 as follows:

The interior of the apparatus is provided with a series of tubular sleeves *d* placed coaxially in the tube *e*. This tube *e* is doublewalled and it is made for two-thirds of its height of fine net-work¹⁵, the remaining third being of sheet metal. The sleeves *d* are conically enlarged toward the front end. The narrow rear ends are all turned toward the barrel and constitute together a canal for the projectile *P* . . . The tube *e* is surrounded by a second tube *g* of a greater diameter than [tube] *e*, the position of which is eccentric with regard to the common axis of the tubular sleeves *d*. This tube *g* is perforated at the first part *g'* for one-third of its length. A third tube *h* perforated at its rear part for one-third of its length surround the tube *g*. The space between *g* and *h* is filled with shaving of metal, such as aluminum. The position of the tube *h* is also eccentric with regard to the axis of the sleeves *d* so that the sight *c* projects over the device for a few millimeters. *Id.* at 2:53-82.

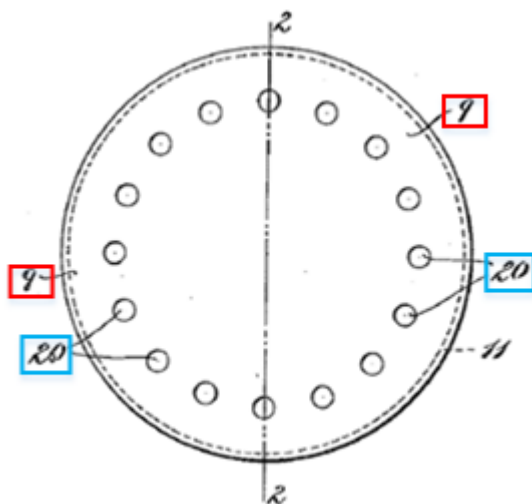
142. Thurler goes on to describe the operation of the EDS illustrated in FIGs. 1 and 2:

The direction followed by the compressed gas is shown by the arrows [in FIG. 1]. The projectile *P*, on leaving the barrel *b*, enters into the channel formed by the narrow extremities of the sleeves *d* closing this channel to the compressed gas which rushes consequently through the annular openings of the tube *e* into the space between the tubes *e* and *g* where it partially expands. From there the gas escapes through the narrow openings of the first or forward third of the tube *g* into the space between *g* and *h* where the gas is prevented from expanding instantly owing to the filling of metal shavings, the escape of gas through the openings in the tube *h* taking place without any report. The solid wall of the forward part of the tube *e* prevents the gas from entering the sleeves *d* thus escaping by the central channel before the shot. *Id.* at 2:83-102.

¹⁵ Thurler's claim 1 describes tube *e* as being "perforated for two third of its length from the front end to the rear." EX1015 at Claim 1.

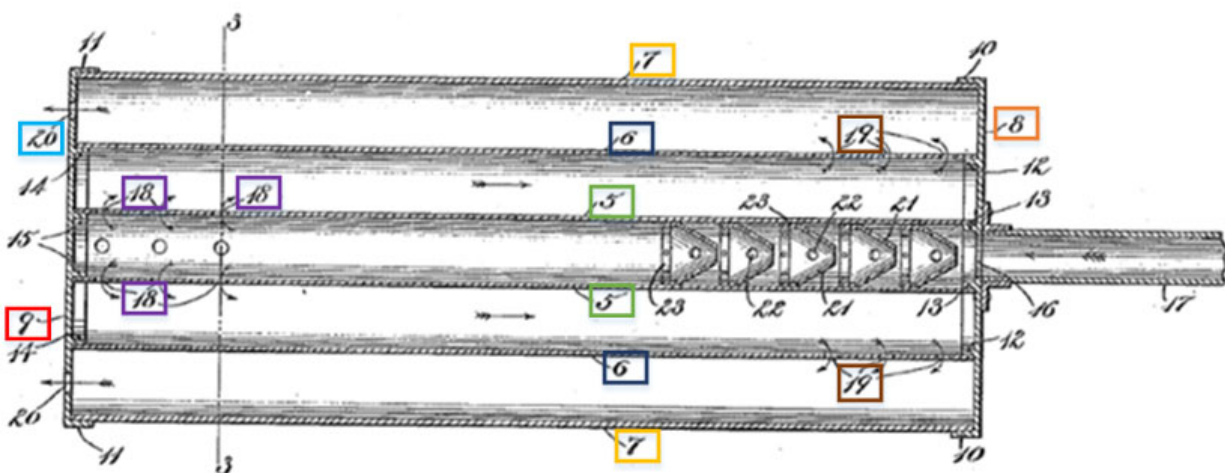
2. ***Bouton (EX1016)***

143. U.S. Application No. 150,961 (“Bouton”) was filed on April 3, 1903, and issued as U.S. Patent No. 748,157 on December 29, 1903. EX1016 at p. 2. Thus, I understand Bouton qualifies as prior art under 35 U.S.C. § 102(a), (b), and (e).
144. Bouton discloses “devices for muffling or deadening the sound of escaping vapors, such as exhaust-team, gasoline vapors, and the like.” *Id.* at 2:8-11. FIGs. 1 through 3 of Bouton disclose one such device made according to Bouton. *Id.* at :38-44. FIG. 1 of Bouton (see below) “is an end elevation of [the] improved muffler.” *Id.* at 2:38-39.



EX1016 at FIG. 1 (annotated)

145. FIG. 2 of Bouton (see below) “is a longitudinal section taken on line 2 2 of FIG. 1, looking toward the left.” *Id.* at 2:39-41.



EX1016 at FIG. 2 (annotated)

146. Bouton describes the ESD illustrated in FIGs. 1 and 2 as follows:

In the drawings, **5**, **6**, and **7** are cylindrical tubes of different diameters, the outermost tube **7** being screw-threaded at each end thereof to receive the heads **8** [and] **9**, each of said heads being provided with a flange **10** [and] **11** . . . [and] annular flanges **12** [and] **13** and **14** [and] **15** . . . said flanges holding the tubes **5** and **6** concentric with each other and with the outermost tube **7**. *Id.* at 2:47-60.

The head **8** is provided with an inlet-orifice **16** and has fastened thereto the exhaust-pipe **17** . . . At the end of the innermost tube **5** opposite to the inlet-orifice **16** are provided outlet-orifices **18** . . . and at the right-hand end of the tube **6** are provided [outlet-]orifices **19** . . . In the head **9** are provided outlet-orifices **20** . . . opening out of the annular spaces adjacent to the outermost tube **7**. *Id.* at 2:61-73.

In the interior of the innermost tube **5** are provided truncated cones **21**, the apexes of said truncated cones pointing toward the inlet-orifice **15**. *Id.* at 2:74-76.

147. Bouton also describes the operation of the ESD illustrated in FIGs. 1 and 2:

The exhaust gasoline [sic] vapor or steam, as the case may be, enters the innermost tube **5** through the pipe **17** and inlet-orifice **15** and first encounters the truncated cones **21**. These decrease the velocity of the exhaust-vapor and after said vapor has passed said cones it has to travel the entire length of the innermost tube **5**, thence passing outwardly

through the orifices 18 into the tube 6, thence passing toward the right . . . to the opposite end of said tube 6 . . . passing outwardly therefrom through the orifices 19 into the tube 7, then passing toward the left . . . into the annular space between the tube 6 and the tube 7 and outwardly through the orifices 20 . . . provided in the head[] 9. It will be seen that during the passage of the exhaust-vapor the velocity is constantly reduced, both by the distance which it has to travel, by the different obstacles in its path or the changing of the direction in which the vapor is traveling and the increased area of the tubes to which it is alternately admitted so that when the vapor finally passes out of the muffler . . . there is no perceptible sound caused thereby. *Id.* at 2:82-3:5.

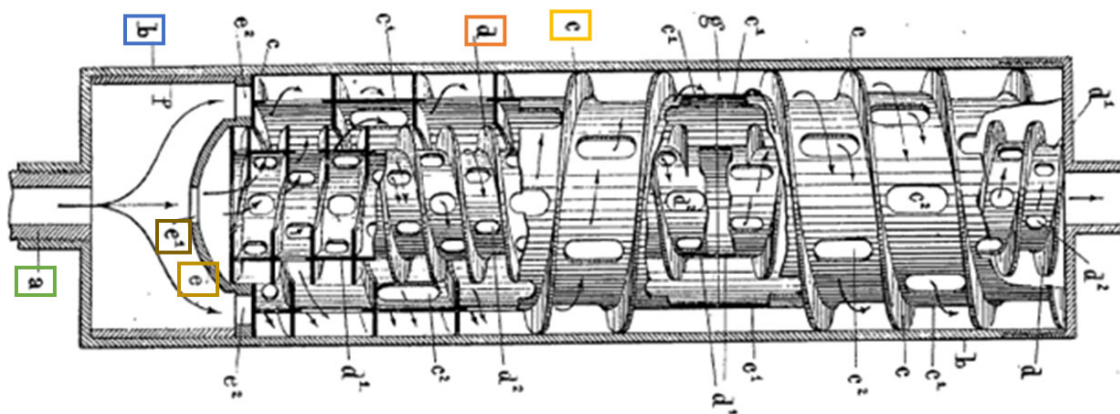
It is evident that the number of tubes may be increased according to the necessities of the case. *Id.* at 3:6-8.

[The] improved muffler is especially adapted to be used in connection with gasoline-engines and motor-vehicles on account of its extreme simplicity, practicability, and the small amount of space which it takes up. *Id.* at 3:9-13.

3. Barlowatz (EX1017 & EX1018)

148. French Patent No. 493,462 (“Barlowatz”) was applied for on May 9, 1917, and published on August 9, 1919. EX1018 at p. 1. Thus, I understand Barlowatz qualifies as prior art under 35 U.S.C. § 102(a) and (b).

149. Barlowatz discloses “a silencer device, particularly applicable to firearms.” *Id.* at p. 1. Barlowatz’s sole figure (referred to herein as “Barlowatz’s FIG. 1”) discloses one such device made according to Barlowatz. Barlowatz’s FIG. 1 (see below) shows “parts in axial vertical section [and] parts in external view with tearing.”



EX1018 at FIG. 1 (annotated)

150. Barlowatz provides the following description of the device illustrated in FIG.

1.

At or near the end of the gun barrel *a*, a cylindrical sleeve *b* is fastened, by screwing or any other suitable means, inside which two coils are nested, one external *c*, the other internal *d*, whose turns are oriented in different directions; These coils are supported by a part *e*, preferably domed in the shape of a cap, held at a certain distance from the end of the gun barrel *a* by a spacer sleeve *f*, housed in the front end of the sleeve *b*. This cap *e* has a hole *e1* at its center, slightly larger in diameter than the projectile, which passes through an axial channel left free in the inner coil *d*; some of the blast gases follow the projectile and enter this inner coil, while most of the gases are diverted by the cap towards the periphery of the sleeve *b* and enter the outer coil *c* through openings *e2* beveled in the cap *e* following the tilt of the turns of this coil. *Id.* at p. 1.

Each coil *c* and *d* consists of a thin, helically wound metal sheet; the turns of these two coils are braced (to prevent them being crushed during the explosion by the sudden impact of the gases) by a metal sheet, *c1* and *d1* respectively, wound between these turns, preferably halfway along the width of the sheet used to form the coils; each coil is thus divided into two helical ducts: the outer coil *c*, into a duct between the coils of the coil, the inner wall of the sleeve *b* and the outer wall of the strip *c1*, and into a duct between the coils, the inner wall of the strip *c1* and the inner coil *d*; the latter is likewise divided into a helical duct between its coils, the outer coil and the outer wall of the strip *d1*, and a

helical duct between the coils, the inner wall of the strip *d1*, and the axial channel for the passage of the projectile. These strips *c1* and *d1* have perforations, holes or notches of any desired shape, respectively *c2* and *d2*, making the two helical parts or ducts of each coil communicate with each other, as well as the inner coil *d* with the outer coil *c*. *Id.* at p. 2.

...

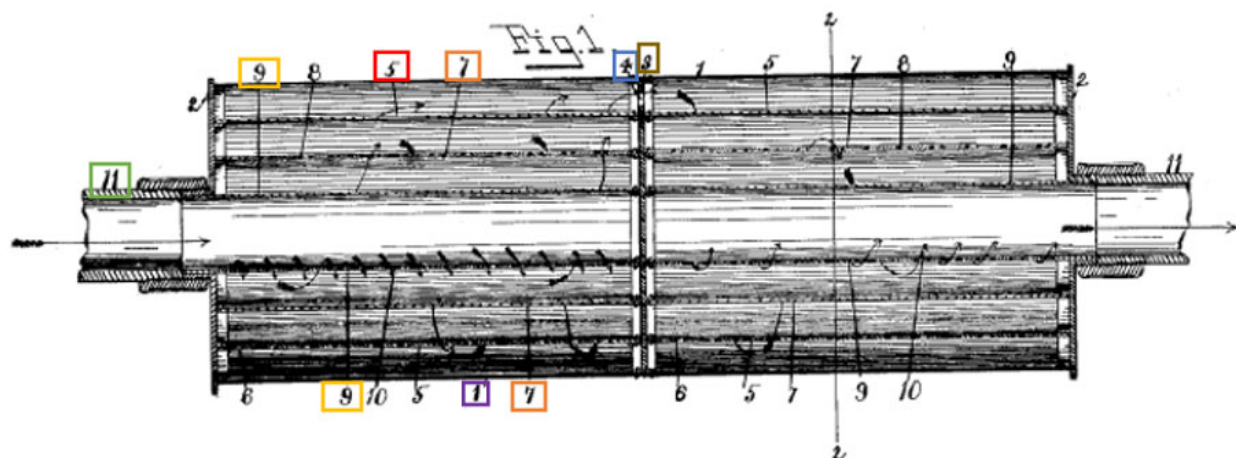
To increase efficiency, several of these groups of two coils can be mounted one after the other in the same outer sleeve, for example two groups as shown in the drawing; in this case, the two outer coils *c* have coils oriented in opposite directions, as do the two inner coils *d*, so that the gas flows leaving the first group have the same flow direction of two coils *c, d* at an already reduced speed, are forced to change direction in both the outer and inner coils. *Id.*

151. Barlowatz concludes by noting that “it goes without saying that this silencer device can also be used for other purposes, for example as a silencer for internal combustion engines.” *Id.*

4. Reeves (EX1019)

152. U.S. Patent No. 582,485 to Reeves (“Reeves”) was applied for on January 11, 1897, and issued on May 11, 1897. EX1019 at p. 2. Thus, I understand Reeves qualifies as prior art under 35 U.S.C. § 102(a), (b), and (e).

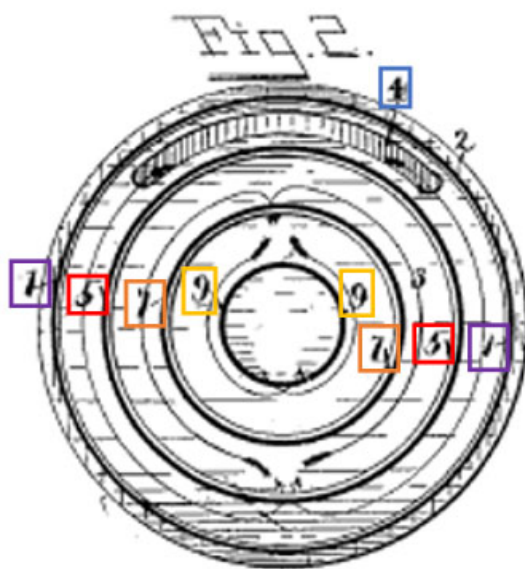
153. Reeves’s FIG. 1 (see below) shows a central vertical section of an “exhaust-muffler.” *Id.* at 2:32-33.



Id. at FIG. 1

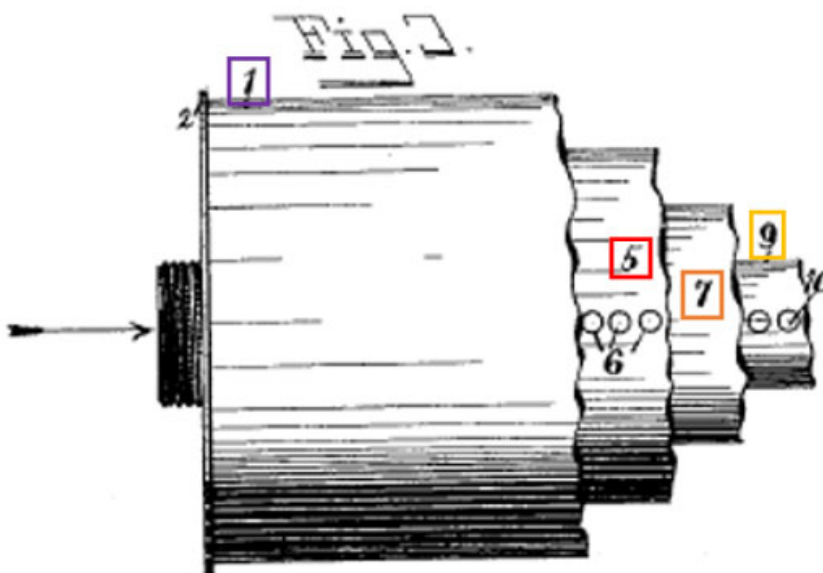
154. Reeves's FIG. 2 (see below) shows a section on line 2-2 of Reeves' FIG. 1.

Id. at 2:33, 34.



Id. at FIG. 2

155. Reeves's FIG. 3 (see below) shows a side elevation of Reeves' FIG. 1, broken away. *Id.* at 2:34-35.



Id. at FIG. 3

156. Reeves describes the device illustrated in FIGs. 1-3 as follows:

The numeral 1 represents an outer shell, preferably cylindrical and supported between flanged ends 2. A central flanged partition 3, provided with a slot-opening 4, divides the shell into two cylindrical compartments. *Id.* at 2:32-35.

Concentric with the shell 1, but of smaller diameter, are the shells 5, one in each compartment, extending between an end 2 and the central partition 3, each provided with a longitudinal row of perforations 6. Concentric with shells 5, but of smaller diameter, are two shells 7, one in each compartment and each provided with a row of longitudinal perforations 8 on the opposite side from perforations 6. Concentric with shells 7, but of smaller diameter, are two shells 9, one in each compartment and each provided with a row of longitudinal perforations 10 on the opposite side from perforations 8. *Id.* at 2:36-53.

Leading from each of the small chambers, formed by the smaller shells, is a pipe 11. A gas or liquid entering the small chamber at one end must, before being expelled at the other end, pass through 180° in each annular chamber between the shells. *Id.* at 2:54-59.

157. Reeves describes the operation of the device illustrated in FIGs. 1-3 as follows:

For illustration, suppose the pipe 11, at the left, is connected with the exhaust of an engine. The exhaust product first passes into the small chamber, then through perforations 10 into the annular chamber between shells 9 and 7, around within this chamber, through perforations 8, into the chamber between shells 7 and 5, thence to perforations 6, into the chamber between shells 5 and 1, thence through opening 4 in partition 3 into the chamber at the right-hand side. In this latter chamber the gas passes from the larger to the smaller chamber through a path similar to that described, only reversed, and is finally exhausted from the smaller chamber into the latter series. The gas is thus gradually expanded and exposed to a large cooling-surface, whereby it is reduced in pressure and temperature to a point nearly normal, thereby preventing the report incident to the engine-exhaust. We find that the efficiency of the device is materially increased by filling the annular chambers with a granular material, Such as coke about the size of hickory-nuts, which breaks up and cools the gas more rapidly. *Id.* at 2:54-84.

158. More generally, Reeves describes:

an exhaust-muffler of a series of concentric chambers formed of a series of concentric shells of different diameters, openings longitudinally disposed upon alternate sides of adjacent shells, an inlet for the smaller chamber, an outlet for the larger leading into a series of concentric chambers similar to the first series. *Id.* at Claim 1.

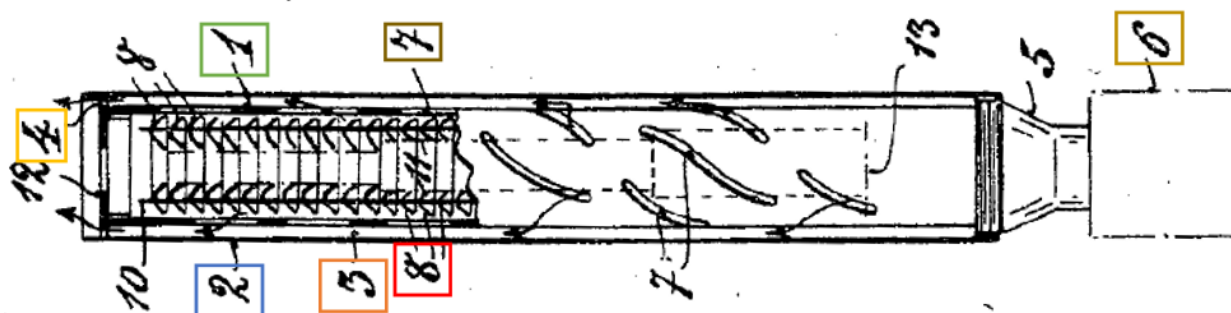
159. Reeves also explains that:

We have shown a preferred form of device, but it is obvious that the same results would be attained if the partitions were perforated circumferentially at alternate ends, so as to provide a long path, through which the gas must flow before being finally exhausted. *Id.* at 2:85-90.

5. *Eichenseher (EX1020 & EX1021)*

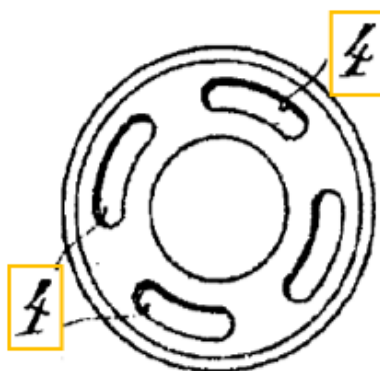
160. German Patent No. 305,012 to Eichenseher (“Eichenseher”) was applied for on January 9, 1917, and issued on January 7, 1920. EX1021 at p. 1. Thus, I understand Eichenseher qualifies as prior art under 35 U.S.C. §102(a) and (b).

161. Eichenseher discloses “silencers for firearms . . . in which a double-walled hollow body is fitted with loosely stacked catcher shells.” *Id.* Eichenseher’s FIGs. 1-5 depict two examples of such a device made according to Eichenseher. For a rifle example, Eichenseher’s FIG. 1 (see below) depicts a longitudinal section.



EX1021 at FIG. 1 (annotated)

162. For the rifle example, Eichenseher’s FIG. 2 (see below) depicts a top view.



EX1021 at FIG. 2 (annotated)

163. Eichenseher describes the device illustrated in FIG. 1 as follows:

The hollow body is formed in a known manner by the two cylinders **1** and **2** placed one inside the other and held at a suitable distance, whereby according to the embodiment in Figs. 1 and 2, the two cylinders are screwed tightly together at the bottom, while slots **4**, which can be adjustable by slides or the like, are provided at the top in the ring closing off cavity **3**. The double-walled hollow body **1** and **2** is screwed onto rifle barrel **6** by means of a mouthpiece **5** or otherwise fastened in a detachable manner . . . Inner cylinder **1** is provided with slots **7** along its entire length, which run parallel to the twist (see Fig. 1). The purpose of this is to ensure that the gases swirling with the projectile in the direction of the twist can quickly escape through slots **7** into cavity **3** and from there through openings **4** into the open air with as little resistance as possible. *Id.* at p. 1.

Inner cylinder **1** serves to accommodate known silencers **8** which, as shown in Fig. 4, have a slightly trough-shaped cross-section and are slightly retracted at equal distances around the circumference (Fig. 5), so that notches **9** are formed through which gases can escape. *Id.* at pp. 1-2.

164. Eichenseher further states that:

The mode of operation is such that sound is effectively intercepted by sound absorbers **8**, while the powder gases can escape through **9**, **7**, **3** and **4**, whereby the resistance is reduced to a minimum. *Id.* at p. 2.

C. Analogous Nature Of The Applied Prior Art References.

165. I have reviewed and analyzed the foregoing prior art references to determine whether they are analogous to the '750 Patent. *See* Section VI.D *supra*.

166. The '750 Patent is related to suppressing "high velocity/high temperature gases, projectiles, heat or sound energy." EX1001 at 10:22-27. Thurler, Barlowatz, and Eichenseher disclose and describe devices for suppressing energy caused by operating a firearm. Bouton and Reeves disclose and describe devices

for suppressing energy caused by operating a combustion engine. While the source of the high energy may differ, each prior art reference, like the '750 Patent, describes a device related to the suppression of high velocity/high temperature gases, projectiles, heat or sound energy.

167. It has long been known that designs for suppressing energy caused by operating a firearm device are applicable to suppressing energy caused by other devices (such as combustion engines), and *vice versa*. See e.g., EX1001 at 10:22-27 (“other applications can also benefit from these configurations. For example, high velocity/high temperature gases, projectiles, heat or sound energy can be suppressed using these devices”); EX1004 at pp. 124, 125; EX1018 at p. 2 (“it goes without saying that this silencer device can also be used for other purposes, for example as a silencer for internal combustion engines.”); EX1024 at 1:12-13.

168. Thus, it is my opinion that each of the foregoing references is related to the same field of endeavor and/or reasonably pertinent to the problem faced by the '750 Patent.

X. APPLICATION OF THE PRIOR ART REFERENCES TO THE CLAIMS

169. In my opinion, in view of the prior art references, claims 1-22 of the '750 Patent are unpatentable under 35 U.S.C. § 102 (pre-AIA) and/or 35 U.S.C. § 103 (pre-AIA).

Grounds	35 U.S.C.
GROUND 1: Thurler anticipates Claims 1, 4, 5, 7-9, 15-17, 19, and 22.	102 (pre-AIA)
GROUND 2: Thurler renders obvious Claims 1, 4-11, 15-17, 19, 21, and 22.	103 (pre-AIA)
GROUND 3: Thurler in view of Bouton renders Claim 18 obvious.	103 (pre-AIA)
GROUND 4: Thurler in view of Barlowatz renders Claims 1, 4-17, and 19-22 obvious.	103 (pre-AIA)
GROUND 5: Barlowatz anticipates Claims 1, 9, 19, and 20.	102 (pre-AIA)
GROUND 6: Barlowatz renders Claims 1, 9, 19, and 20 obvious.	103 (pre-AIA)
GROUND 7: Barlowatz in view of Reeves renders Claim 2 obvious.	103 (pre-AIA)
GROUND 8: Eichenseher in view of Barlowatz renders obvious Claims 1, 3, 4, 5, 8, 9, 18, and 19.	103 (pre-AIA)

A. Grounds Of Unpatentability For Each Challenged Claim

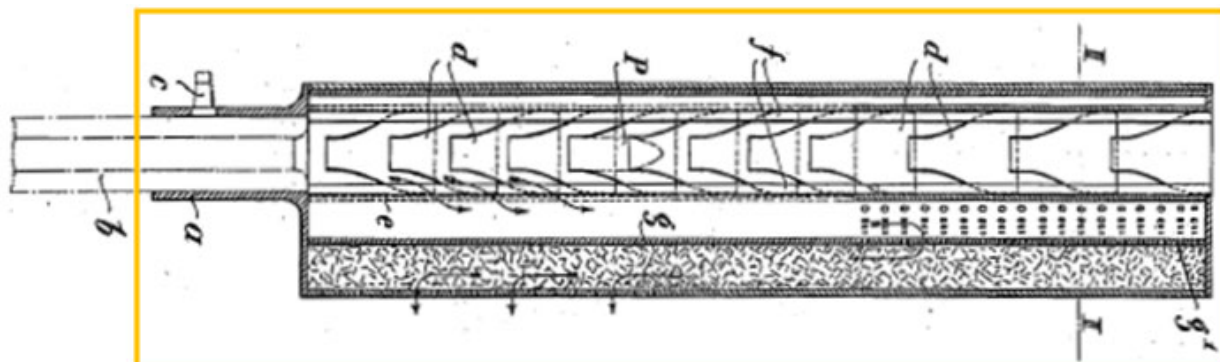
170. To support my opinion, I provide, with specificity, both pictorial and textual mappings between the limitations of the claims and the applied prior art references.

1. GROUND 1: Thurler anticipates Claims 1, 4, 5, 7-9, 15-17, 19, and 22.

171. In my opinion, Thurler discloses all the limitations of Claims 1, 4, 5, 7-9, 15-17, 19, and 22.

a) Claim 1 (Independent).

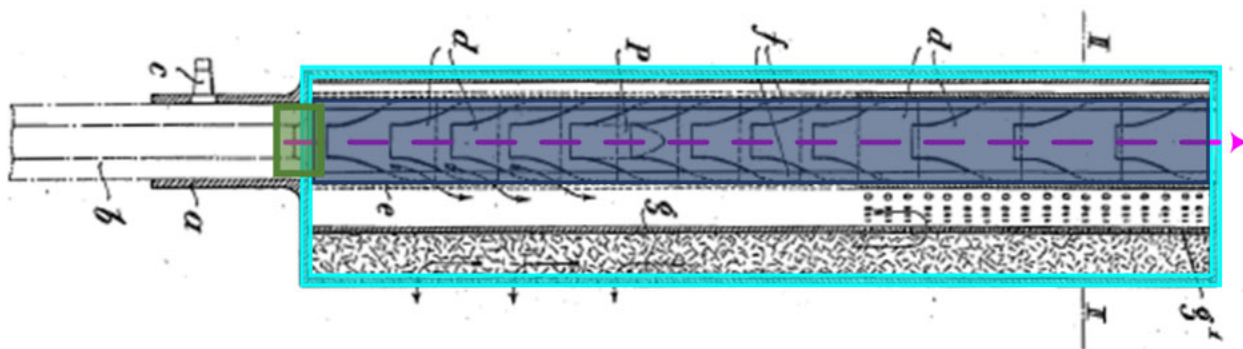
(1) [1Pre] **“An energy capture and control device, comprising:”**



EX1015 at FIG. 1 (annotated)

172. Thurler is related to “devices for lessening the report of firearms.” EX1015 at 2:9-10. Thurler’s FIG. 1 illustrates such a device (which I refer to throughout this Declaration as “Thurler’s ESD”), and, thus, discloses the “energy capture and control device” of Claim 1.

(2) [1A] **“a) a central chamber oriented along a central axis within an outer shell, said central chamber having an inlet configured to receive a high energy material from a high energy outlet;”**



EX1015 at FIG. 1 (annotated)

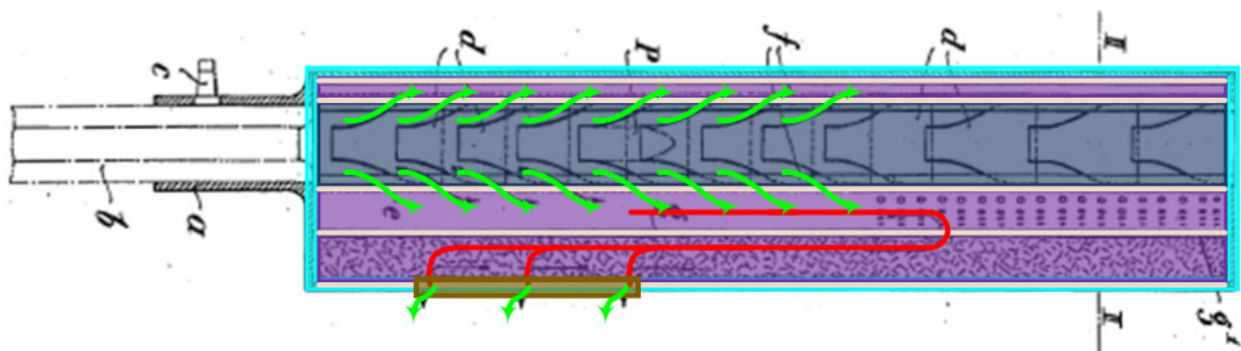


EX1015 at FIG. 2 (annotated)

173. The space within Thurler's tube *e* discloses the "central chamber." The axis through Thurler's tube *e* discloses the "central axis." Thurler's outermost tube *h* discloses the "outer shell." And the inlet at the beginning of Thurler's tube *e* discloses the "central chamber having an inlet configured to receive a high energy material from a high energy outlet."

(3) [1B] "b) a common off axis chamber oriented within the outer shell in fluid communication with the central chamber and having a fluid outlet and multiple internal walls defining a serpentine fluid pathway which is at least one of axially serpentine

and radially serpentine and which dissipates energy transferred from the high energy material; and"



EX1015, FIG. 1 (annotated)

174. Thurler discloses that the “inner casing [e] is further inclosed [sic] in one or more mantles which are alternately perforated at the front or rear end.” EX1015 at 2:27-30. Thurler, with this disclosure, when read in light of the ESD disclosed in FIG. 1, discloses embodiments that include a common off-axis chamber having three or more tubes that are alternately perforated. *See* FIG 3, below (modifying Thurler’s figure to include this disclosure and a mapping of the same).

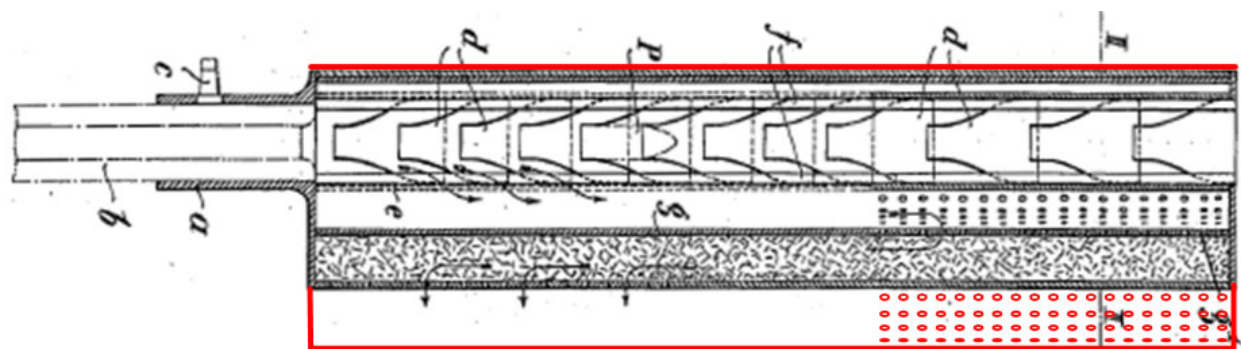


Figure 3 (modified to include disclosure)

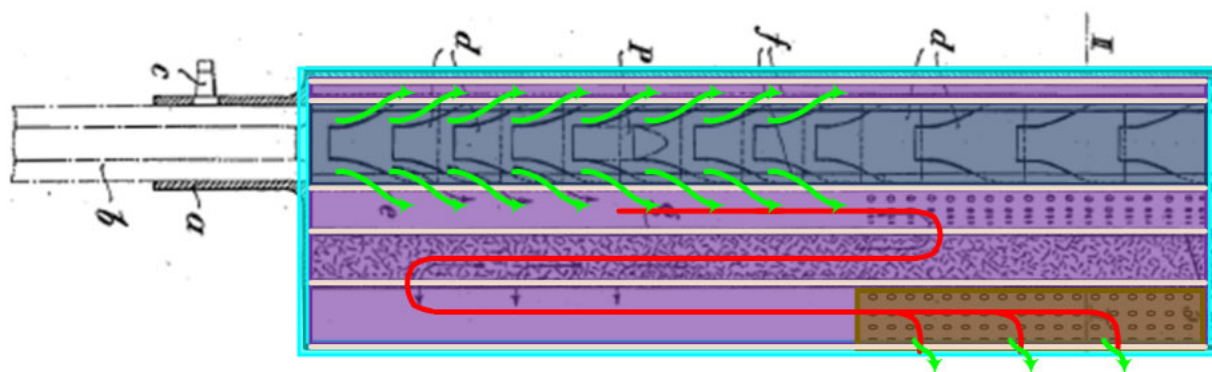
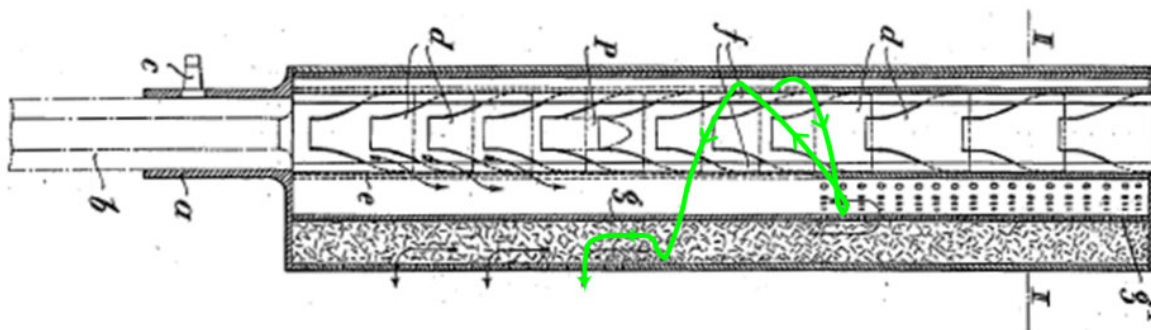


Figure 4 (modified to include disclosure)

175. As such, when applying the ordinary and customary meaning (that a serpentine fluid pathway that causes “back and forth” fluid flow requires multiple changes in direction (*see* Section VIII.A.4, *supra*)), Thurler’s fluid pathway that extends back and forth along the walls of Thurler’s tube *g*, *h* and the added tube as Thurler describes, discloses “a serpentine fluid pathway which is . . . axially serpentine.” For example, the walls of tubes *e* and *g* will cause gas that escapes from tube *e* to travel in a first (*e.g.*, forward) direction on its path to the perforations at the end of tube *g* before entering tube *h*, where the walls of tubes *g* and *h* will cause the gas to travel back in a second (*e.g.*, backward) direction on its path to the perforations at the beginning of tube *h* before entering the added tube, where the walls of tube *h* and the added tube will cause the gas to travel forth again in the first direction on its path to the perorations at the end of the added tube.

176. In addition, Thurler's fluid pathway that extends radially through the tube *g*, the larger tube *h*, and the again larger added, disclosed tube discloses "a serpentine fluid pathway which is . . . radially serpentine." For example, the walls of tubes *e* and *g* will cause gas that escapes from the top of tube *e* to travel in a first (e.g., clockwise) direction before traveling radially outward into the larger tube *h*, where the walls of tubes *g* and *h* will cause the gas to travel back in an opposing (e.g., counterclockwise) direction before traveling radially outward into the larger added tube, where the gas will travel forth again in the first direction.

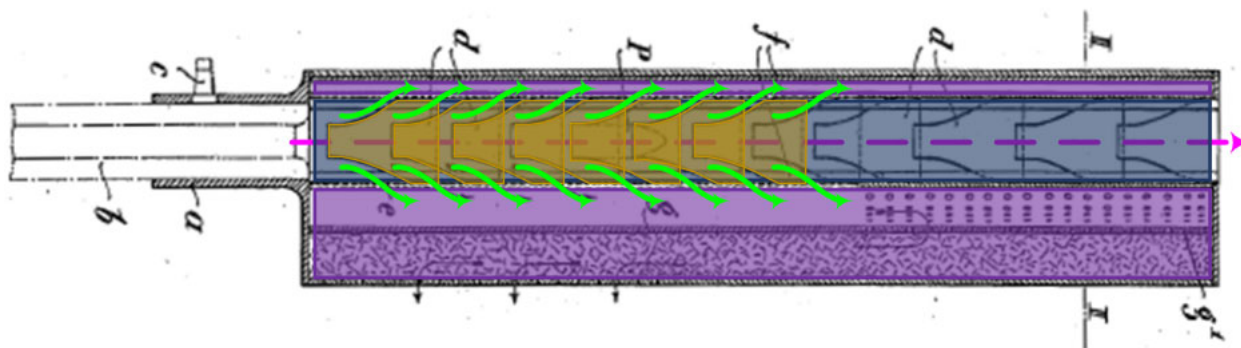
177. I understand that in the related litigation, patent owner has taken the position that a serpentine fluid pathway requires a single change of direction (*See* EX1034 at p. 4). While I disagree with this interpretation of the meaning of that claim term, Thurler nevertheless discloses "a serpentine fluid pathway which is . . . axially serpentine and radially serpentine," under patent owner's proffered definition. *See* EX1015 at FIG. 1 *infra*.



EX1015 at FIG. 1 (annotated)

178. Also, I understand that in the related litigation, patent owner has taken the position that “a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine” is a serpentine fluid pathway which is axially serpentine or radially serpentine (*See* EX1033 at pp. 3, 4, 6). While I disagree with this interpretation of the meaning of that claim term, Thurler nevertheless discloses this limitation under patent owner's proffered definition as Thurler discloses an axially serpentine fluid pathway, a radially serpentine pathway, or both.

(4) [1C] “c) a plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber.”

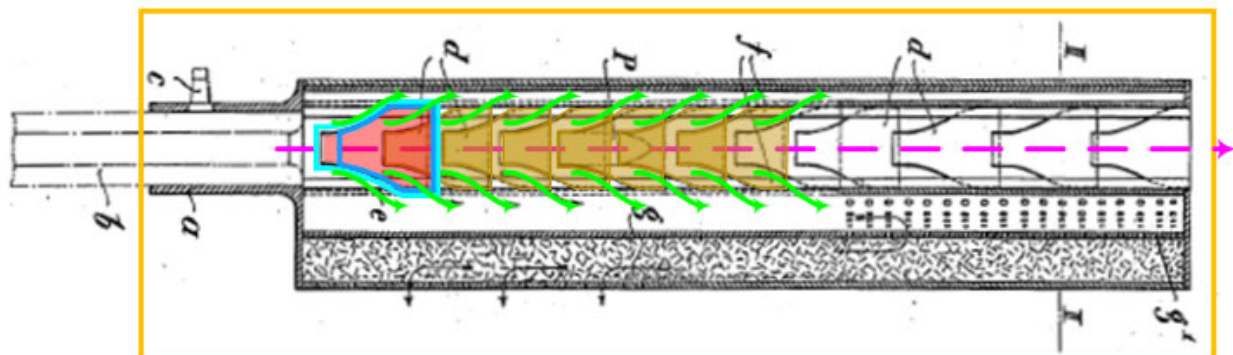


EX1015 at FIG. 1 (annotated)

179. At least Thurler's first two sleeves *d*, which are configured to deflect energy from the projectile *P* to the second tube *g*, disclose the “plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber.”

b) Claim 4.

(1) [4A] “**The device of claim 1**, wherein **the plurality of deflectors each comprise a frustoconical shape having a hollow interior along the central axis and a flared exit portion.**”



EX1015 at FIG. 1 (annotated)

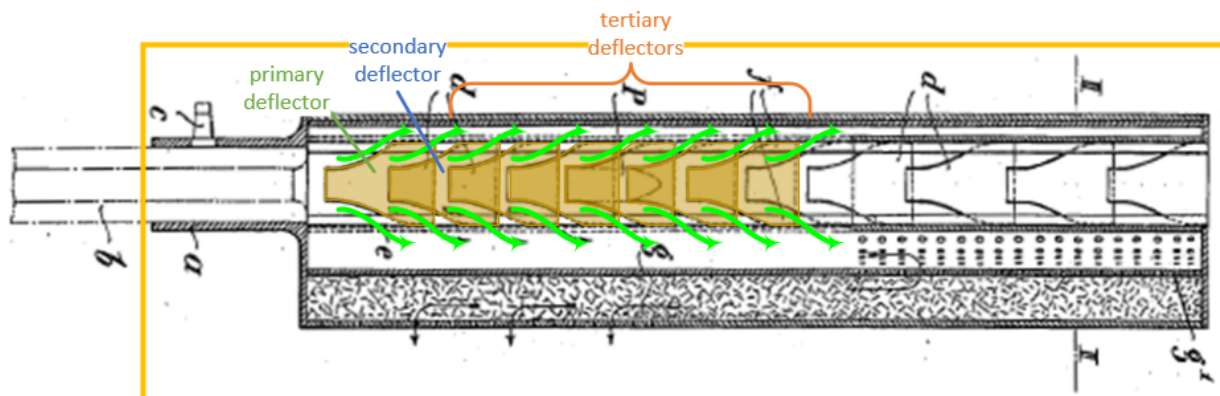
180. See Section X.A.1.a), *supra*, for a discussion of Claim 1.

181. The frustoconical shape¹⁶ of Thurler's sleeves *d* having a hollow interior through which the projectile *P* travels and a flared exit portion discloses “the plurality of deflectors each comprise a frustoconical shape having a hollow interior along the central axis and a flared exit portion.”

¹⁶ A frustoconical shape is a frustum of a cone (*i.e.*, the portion of a cone remaining after its upper part has been cut off by a plane parallel to its base).

c) Claim 5.

- (1) [5A] “**The device of claim 4, wherein the plurality of deflectors include a primary deflector, a secondary deflector, and at least one tertiary deflector.**”



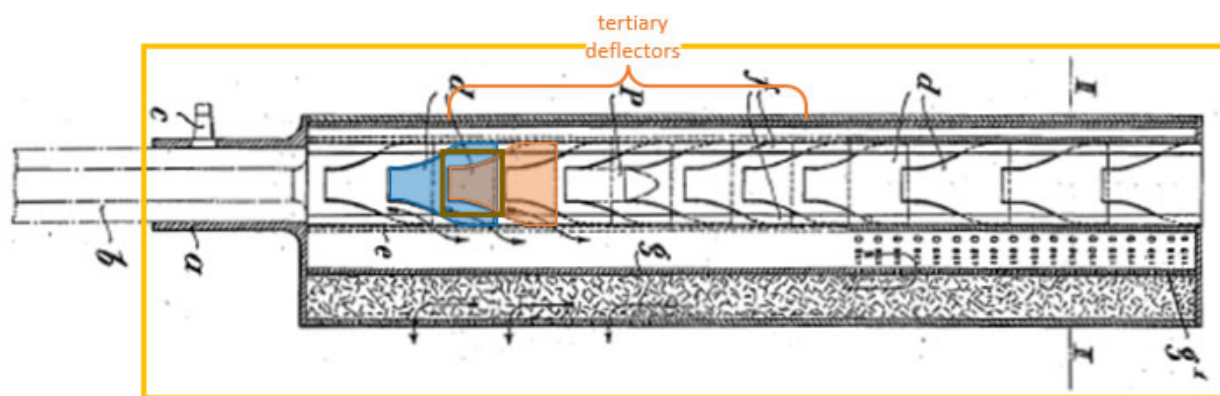
EX1015 at FIG. 1 (annotated)

182. See Sections X.A.1.a), X.A.1.b), *supra*, for a discussion of Claims 1 and 4.

183. Thurler's first, second, and third sleeves *d* disclose “a primary deflector, a secondary deflector, and at least one tertiary deflector.”

d) Claim 7.

- (1) [7A] “**The device of claim 5, wherein at least one tertiary deflector is at least partially engaged within the flared exit portion of an adjacent deflector.**”



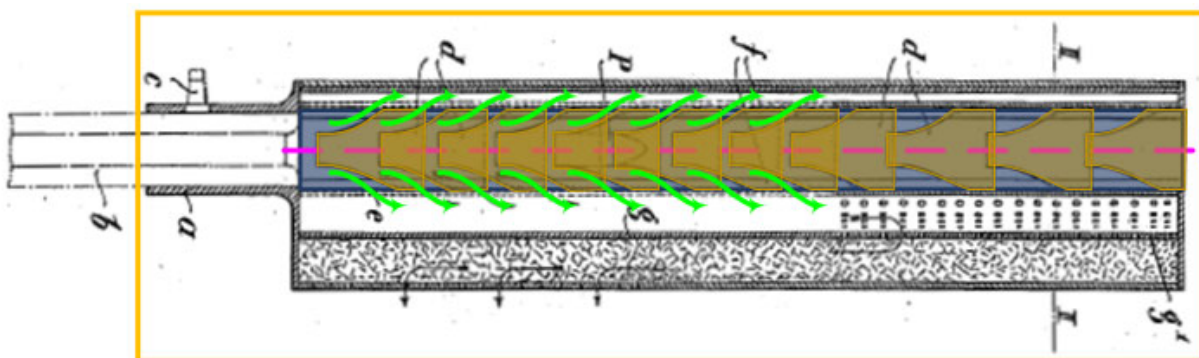
EX1015 at FIG. 1 (annotated)

184. See Sections X.A.1.a), X.A.1.b), and X.A.1.c), *supra*, for a discussion of Claims 1, 4, and 5.

185. The narrow end of Thurler's third sleeve *d* being positioned within the flared end of Thurler's second sleeve *d* discloses "at least one tertiary deflector is at least partially engaged within the flared exit portion of an adjacent deflector."

e) Claim 8.

(1) [8A] "The device of claim 4, wherein the plurality of deflectors span substantially the entire central axis along the central chamber."



EX1015 at FIG. 1 (annotated)

186. See Sections X.A.1.a), X.A.1.b), *supra*, for a discussion of Claims 1 and 4.

187. Whether "the plurality of deflectors" is construed as including all the deflectors in the central chamber or only the deflectors in the central chamber that directly deflect energy into the common off-axis chamber, Thurler's ESD further discloses this limitation.

188. Thurler's sleeves *d* substantially spanning Thurler's entire tube *e* would disclose "the plurality of deflectors span[ning] substantially the entire central axis along the central chamber."

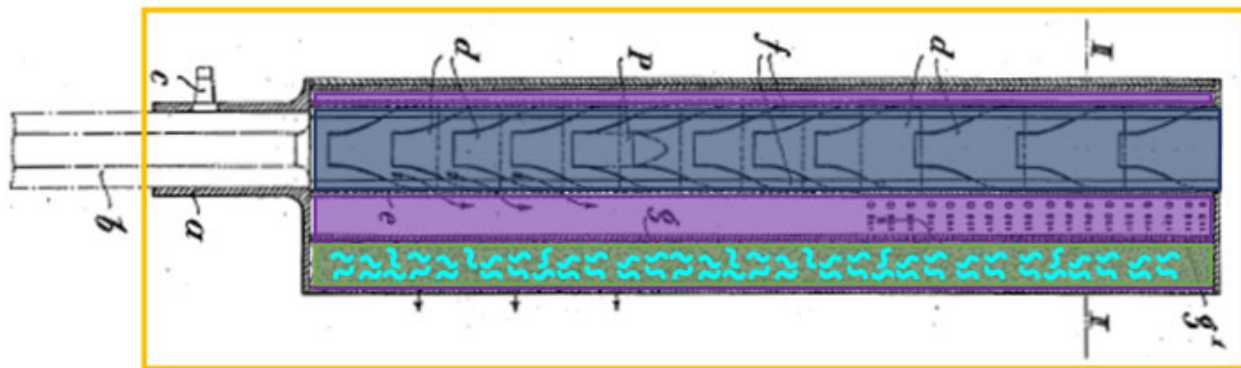
f) Claim 9.

(1) [9A] "The device of claim 1, wherein the multiple internal walls are formed to produce a radially serpentine fluid pathway."

189. See Section X.A.1.a)(3), *supra*, for a related discussion with reference to Claim 1.

g) Claim 15.

(1) [15A] "The device of claim 1, wherein the common off axis chamber further includes an annular dampening chamber oriented about the central chamber and being filled with an energy absorbent material."



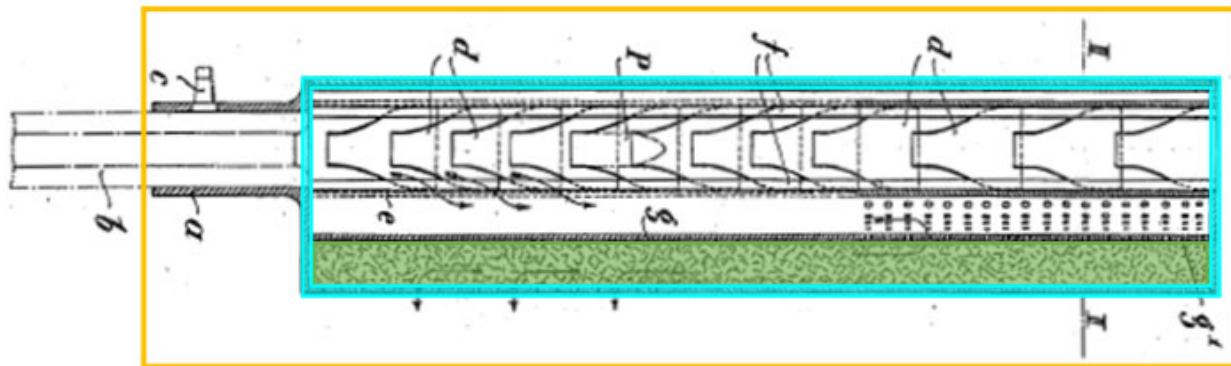
EX1015 at FIG. 1 (annotated)

190. See Section X.A.1.a), *supra*, for a related discussion regarding Claim 1.

191. The space between tubes *g* and *h* is filled with shavings of metal, such as aluminum (see EX1015 at 2:77-88), which discloses "the common off axis chamber further includes an annular dampening chamber oriented about the central chamber and being filled with an energy absorbent material."

h) Claim 16.

(1) [16A] “**The device of claim 15**, wherein **the dampening chamber is oriented adjacent the outer shell.**”



EX1015 at FIG. 1 (annotated)

192. See Sections X.A.1.a), X.A.1.g), *supra*, for a discussion of Claims 1 and 15.

193. As can be seen from Thurler's FIG. 1, the metal shavings are included in Thurler's exterior tube *g*. Given Thurler's disclosure of a common off-axis chamber having three or more tubes, Thurler discloses including the metal shavings in the outermost tube.

194. The space between tubes *g* and *h*, which is filled with shavings of metal and adjacent to the exterior of Thurler's tube *h*, discloses “the dampening chamber is oriented adjacent the outer shell.”

i) Claim 17.

(1) [17A] “**The device of claim 15**, wherein the energy absorbent material is selected from the group consisting of powder tungsten filament, heavy metal powder, graphite, polymer, aluminum, stainless steel, carbon steels, iron, copper, tantalum, titanium, vanadium, chromium, zirconium, carbides of these, alloys of these, and combinations thereof.”

195. See Sections X.A.1.a), X.A.1.g), *supra*, for a discussion of Claims 1 and 15.

196. I understand, from counsel, that Claim 17 is a “Markush” claim that recites a list of alternatively useable members. Thus, I understand that to anticipate dependent Claim 17, Thurler needs to disclose only a single member of the group. Thurler discloses that “the space between [tubes] *g* and *h* is filled with metal shavings, such as aluminium.” (EX1015 at 2:77-88) thereby disclosing “the energy absorbent material is selected from the group consisting of . . . aluminum . . . and combinations thereof.”

j) Claim 19 (Independent).

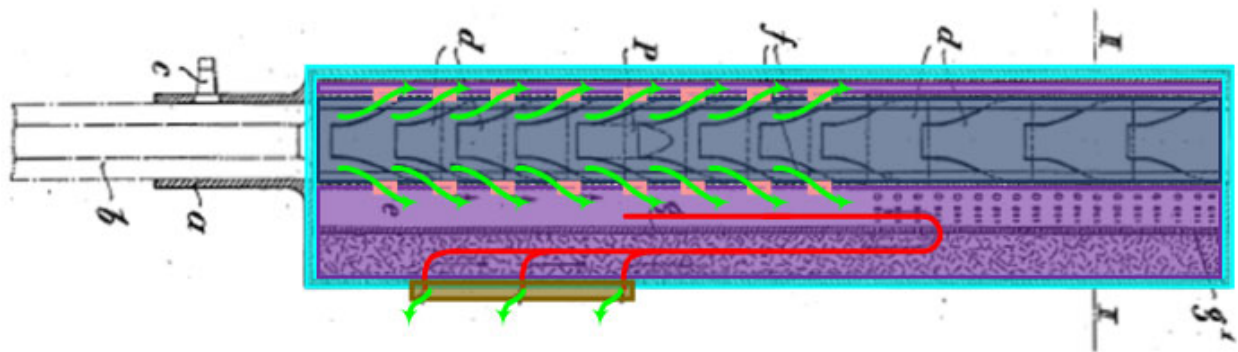
(1) [19Pre]

197. See Section X.A.1.a)(1), *supra*, for a discussion of this limitation.

(2) [19A]

198. See Section X.A.1.a)(2), *supra*, for a discussion of this limitation.

(3) [19B] “b) a common off axis chamber oriented within the outer shell in fluid communication with the central chamber via a plurality of orifices and further includes a fluid outlet, the common off axis chamber comprising a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine; and”

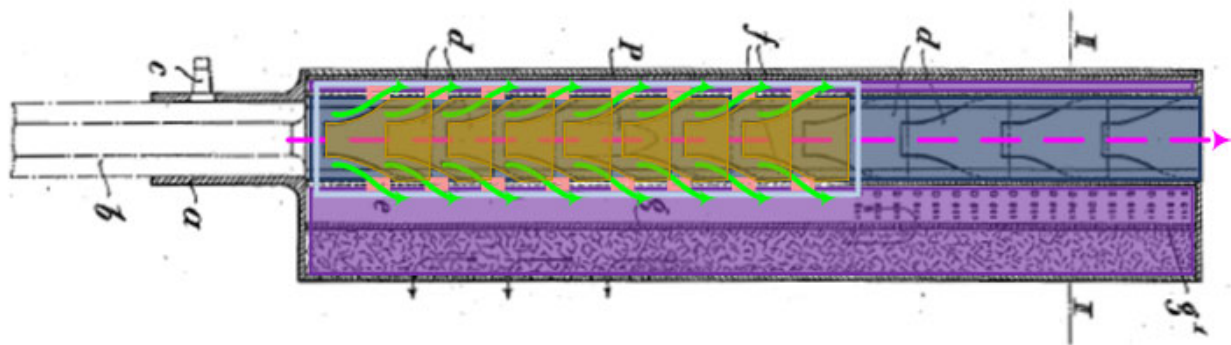


EX1015 at FIG. 1 (annotated)

199. See Section X.A.1.a)(3), *supra*, for a discussion of aspects of this limitation.

200. The perforations running along the first two-thirds of tube *e* (see EX1015 at Claim 1, Ins. 28-30) disclose the “plurality of orifices.” Thurler’s ESD discloses all the remaining limitations recited in the above limitation. See Section X.A.1.a)(3), *supra*.

(4) [19C] “c) **a plurality of deflectors oriented in series along the central axis of the central chamber, wherein a position of multiple individual deflectors of the plurality of deflectors corresponds with the individual orifices of the plurality of orifices to the common off axis chamber.**”



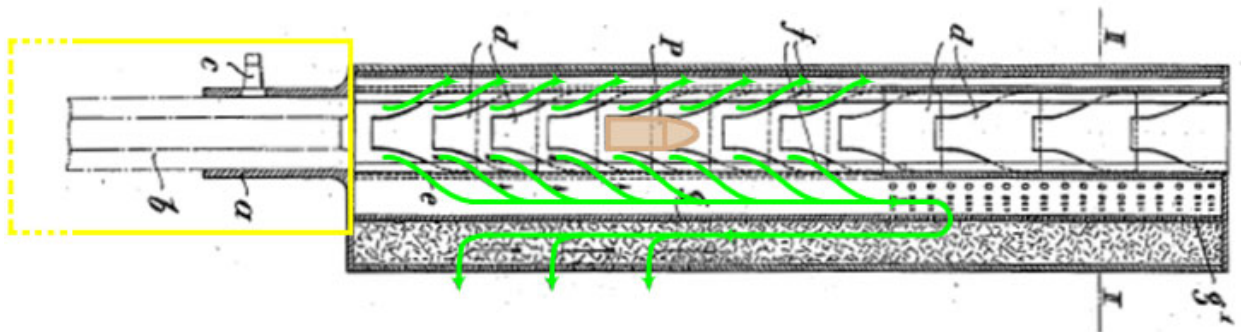
EX1015 at FIG. 1 (annotated)

201. See Section X.A.1.a)(4), *supra*, for a discussion of aspects of this limitation.

202. The sleeves *d* that deflect energy to the tube *g* through the perforations running along the first two-thirds of tube *e* (see EX1015 at Claim 1, Ins. 28-30) disclose “a position of multiple individual deflectors of the plurality of deflectors corresponds with the individual orifices of the plurality of orifices to the common off axis chamber.” Thurler’s ESD discloses all the remaining limitations recited in the above limitation. See Section X.A.1.a)(4), *supra*.

k) Claim 22 (Independent).

(1) [22Pre] “A method for **energy capture and control from a high energy device**, comprising:”

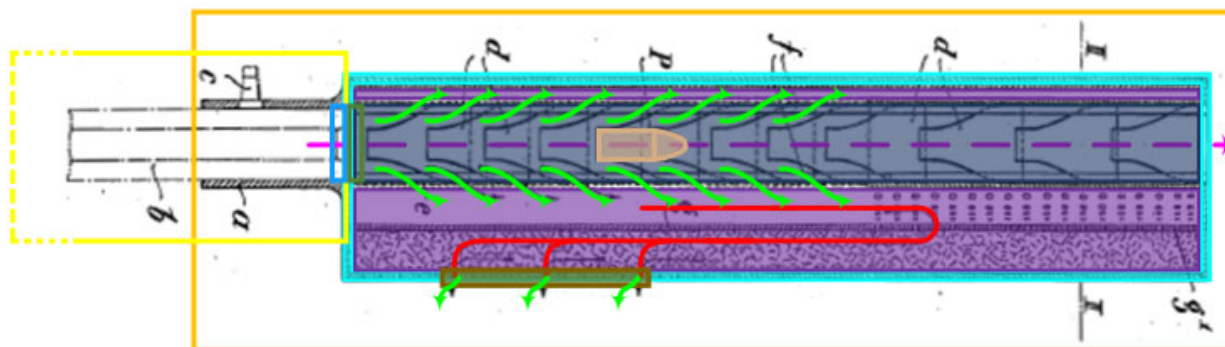


EX1015 at FIG. 1 (annotated)

203. Thurler's FIG. 1 illustrates the capture and control of energy caused by discharging the projectile *P* from the barrel *b* of a rifle through Thurler's ESD. EX1015 at 2:37-39, 2:84-86. Additionally, Thurler's description of guiding the compressed gas (caused by discharging the projectile *P* through Thurler's ESD) through the annular openings of the tube *e* into the space between tubes *e* and *g* and then into the space between tube *g* and *h* before exiting the openings in the tube *h* (EX1015 at 2:83-102) discloses “[a] method for energy capture and control from a high energy device.”

(2) [22A] “a) discharging **a high energy material** from **the high energy device** through **an energy capture and control device comprising a central chamber oriented along a central axis within an outer shell**, said central chamber having an inlet configured to receive a high energy material from **a high energy outlet**, and **a common off axis chamber oriented within the outer shell in fluid communication with the central chamber**, the common off axis

chamber comprising an axially serpentine fluid pathway and a fluid outlet; and"

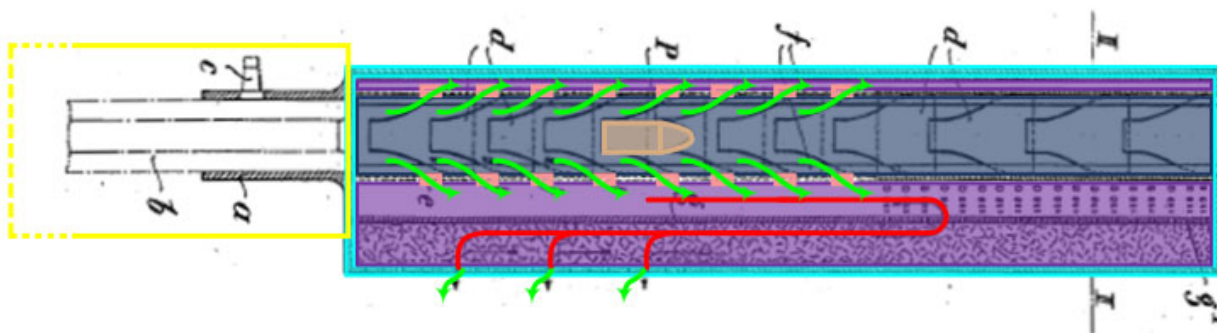


EX1015 at FIG. 1 (annotated)

204. Thurler's FIG. 1 illustrates discharging the projectile *P* from the barrel *b* of a rifle through Thurler's ESD (EX1015 at 2:37-39, 84-86). Additionally, Thurler's description of the projectile *P* leaving the barrel *b* and entering the channel formed by the sleeves *d* discloses "discharging a high energy material from the high energy device through an energy capture and control device," where Thurler's ESD discloses all the limitations of the "energy capture and control device." (see Section X.A.1.a), *supra*).

(3) [22B] "b) capturing **energy within the common off axis chamber** via **a plurality of orifices** from **the central chamber** using **the axially serpentine fluid pathway, the energy being associated**

with discharge of the high energy material from the high energy discharge device.”



EX1015 at FIG. 1 (annotated)

205. Thurler's FIG. 1 illustrates capturing the energy that forms in the central chamber as a result of discharging the projectile *P* from the barrel *b* of a rifle through Thurler's ESD (EX1015 at 2:37-39, 84-86). Additionally, Thurler's description guiding the compressed gas (caused by discharging the projectile *P* through Thurler's ESD) through the annular openings of the tube *e* into the space between tubes *e* and *g* and then into the space between tube *g* and *h* before exiting the openings in the tube *h* (EX1015 at 2:83-102). Thus, Thurler discloses "capturing energy within the common off axis chamber via a plurality of orifices from the central chamber using the axially serpentine fluid pathway, the energy being associated with discharge of the high energy material from the high energy discharge device."

2. GROUND 2: Thurler renders obvious Claims 1, 4-11, 15-17, 19, 21, and 22.

a) Claims 1, 4, 5, 7-9, 15-17, 19, and 22.

206. See Section X.A.1, *supra*, for a discussion of Claims 1, 4, 5, 7-9, 11, 15-17, 19, and 22.

207. Should it be found that Thurler fails to disclose any limitations of Claims 1, 4, 5, 7-9, 11, 15-17, 19, and 22, it is my opinion that Thurler renders obvious any such limitations. In my opinion, Thurler further renders obvious all the limitations of Claims 6, 10, 11, and 21.

b) Claims 1, 19, and 22 (Independent).

208. See Sections X.A.1.a), X.A.1.j), X.A.1.k), *supra*, for a discussion of Claims 1, 19, and 22.

209. If it is found that Thurler fails to disclose “a central chamber” due to the eccentric configuration of the tubes in the ESD disclosed in Thurler, it is my opinion that Thurler teaches or suggests an ESD configuration that includes “a central chamber” that is surrounded by concentric tubes. Thurler discloses that “the position of [the second tube *g*] is eccentric with regard to the common axis of the tubular sleeves *d* . . . [and the] position of the tube *h* is also eccentric with regard to the axis of the sleeves *d* so that the sight *c* projects over the device for a few millimeters.” EX1015 at 2:70-81. In light of this disclosure, Thurler opted to use an eccentric configuration to enable its ESD to be used with existing iron

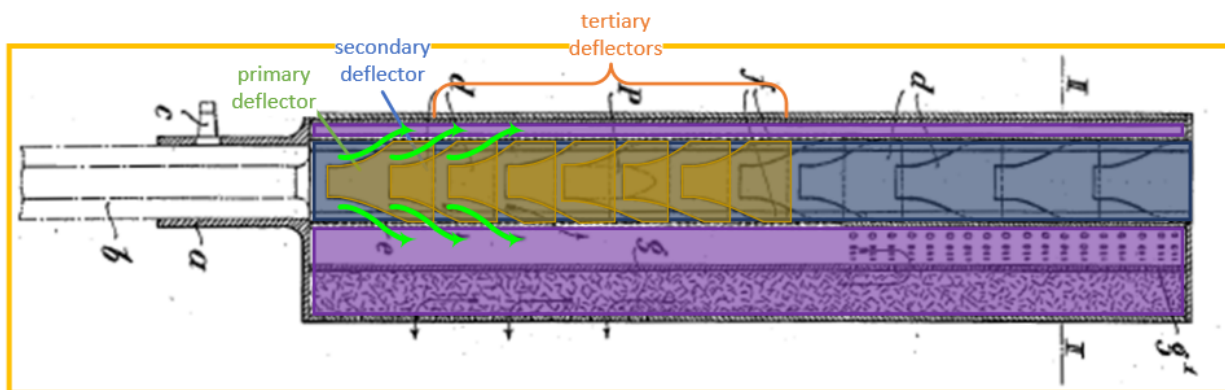
sights on a firearm, which, in my opinion, teaches or suggests concentric configurations for the outer tubes. Moreover, a POSITA would not be discouraged from modifying Thurler to have a concentric configuration (*e.g.*, by the prospect of blocking existing iron sights on a firearm) as suppressor-height sights were widely available at the time of the '750 Patent.

210. Even if Thurler fails to disclose, teach, or suggest concentric configurations for an ESD, it is my opinion that it would have been obvious to a POSITA to modify Thurler's ESD to achieve such a configuration. Modifying Thurler's ESD to achieve such a configuration would have been a simple matter of design choice resulting from a finite number of possibilities: *eccentric or concentric*. As of the effective filing date of the '750 Patent, the motivations for modifying Thurler's ESD to have a concentric configuration include seeking to increase the fluid path area in a balanced way, to simplify the machining process, to modernize Thurler's ESD design, or any combination thereof. Given that a concentric configuration is easier to manufacture and may result in more balanced operation of the ESD (and may have no negative consequences in many firearm and sighting configurations) a POSITA would find it obvious and logical to utilize a concentric system under those common circumstances. For example, many inline-type firearm systems feature standard, as designed, sighting systems where the sighting axis is elevated significantly above bore level—for example, the Steyr AUG, AR15/M16, etc. In

the case of the AR15/M16 system the sighting axis is elevated approximately 2.5 inches above the bore axis. This applies to both “iron sights” and optical sights.

c) Claim 6.

(1) [6A] “**The device of claim 5, wherein the fluid communication between the common off axis chamber and the central chamber occurs only at the primary deflector, the secondary deflector and a first tertiary deflector.**”



EX1015 at FIG. 1 (annotated)

211. See Sections X.A.1.a), X.A.1.b), X.A.1.c), *supra*, for a discussion of Claims 1, 4, and 5.

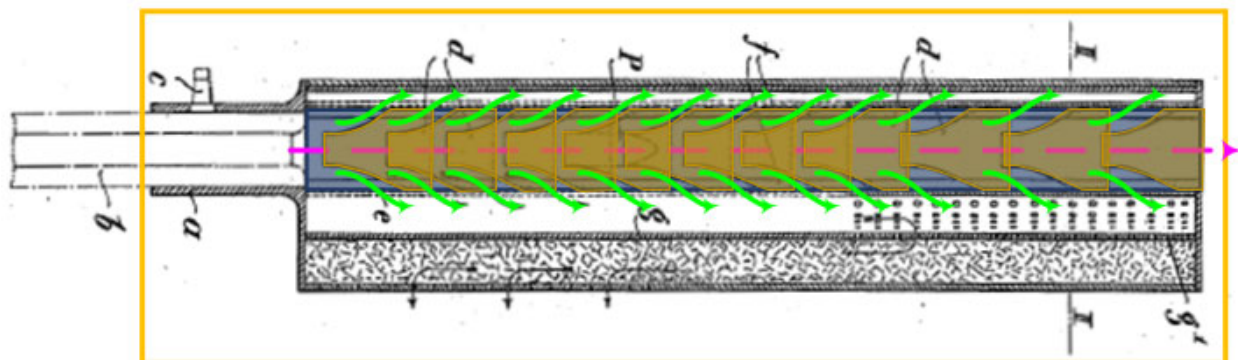
212. Thurler discloses that tube *e* (which separates the central chamber in Thurler from the off axis chamber in Thurler) is “perforated for two thirds of its length.” EX1015 at Claim 1. As such, it is my opinion that Thurler contemplates other lengths of perforations but opted to use a perforation configuration that extends two thirds of the length. In light of this disclosure, it is my opinion that Thurler at least teaches or suggests shorter and longer perforation configurations for the tube *e*, including a shorter perforation configuration that limits fluid communication

between the central chamber and common off axis chamber of Thurler to the first three sleeves *d*.

213. Even if Thurler fails to disclose, teach, or suggest a shorter perforation configuration that limits fluid communication between the central chamber and common off axis chamber of Thurler to the first three sleeves *d*, it is my opinion that it would have been obvious to a POSITA to modify Thurler's ESD to achieve such a configuration. Modifying Thurler's ESD to achieve such a configuration would have been a simple matter of design choice resulting from a finite number of possibilities: *permitting fluid communication from one, two, . . . or all of Thurler's deflectors*. As of the effective filing date of the '750 Patent, the motivations for modifying Thurler's ESD to limit the fluid communication to the first three sleeves *d* include at least seeking to increase the fluid path length, to limit the amount of fluid transferred to Thurler's off axis chamber, or both. It is obvious to a POSITA that such customization would be necessary given that the system is intended to be used with any caliber of firearm, and that such customization/modification would be conducted on a trial and error basis.

d) Claim 8.

(1) [8A] **“The device of claim 4, wherein the plurality of deflectors span substantially the entire central axis along the central chamber.”**



EX1015 at FIG. 1 (annotated)

214. See Sections X.A.1.a), X.A.1.b), *supra*, for a discussion of Claims 1 and 4.

215. Regardless of whether “the plurality of deflectors” is construed as including all the deflectors in the central chamber or as including only the deflectors in the central chamber that directly deflect energy into the common off axis chamber, Thurler’s ESD further renders obvious all the limitations recited in Claim 8.

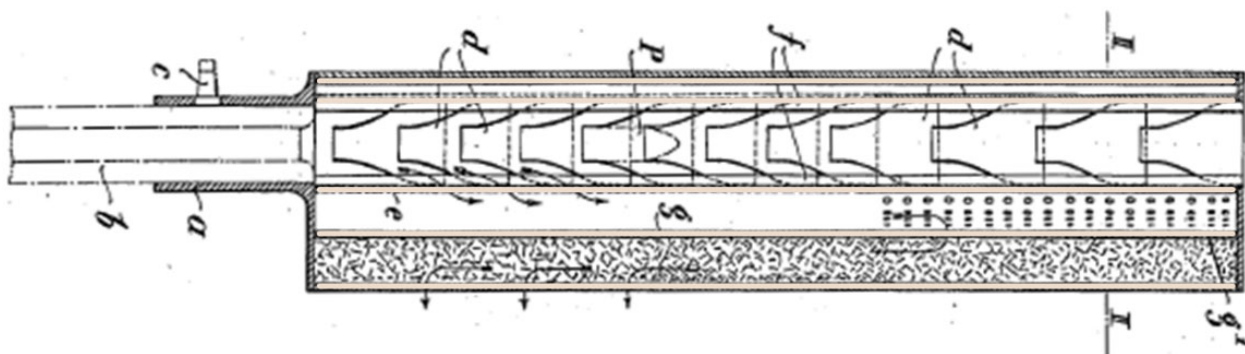
216. As noted in Section X.A.2.c), *supra*, Thurler at least teaches or suggests shorter and longer perforation configurations for the tube *e*, including a longer perforation configuration that allows fluid communication between Thurler’s central chamber and common off axis chamber via all (or nearly all) the sleeves *d*.

217. Moreover, even if Thurler fails to disclose, teach, or suggest a longer perforation configuration that allows fluid communication between Thurler’s

central chamber and common off-axis chamber via all (or nearly all) the sleeves *d*, it is my opinion that it would have been obvious to a POSITA to modify Thurler's ESD to achieve such a configuration. Modifying Thurler's ESD to achieve such a configuration would have been a simple matter of design choice resulting from a finite number of possibilities: *permitting fluid communication from one, two, . . . or all of Thurler's deflectors*. As of the effective filing date of the '750 Patent, the motivations for modifying Thurler's ESD to allow fluid communication via all (or nearly all) the sleeves *d* include at least seeking to increase the amount of fluid transferred to Thurler's off-axis chamber.

e) Claim 10.

(1) [10A] “**The device of claim 1**, wherein **the multiple internal walls are formed by** multiple concentric tubes having progressively larger diameters so as to form annular spaces between each adjacent tube, and having alternating ends offset so as to produce the axially serpentine fluid annular pathway.”



EX1015, FIG. 1

218. See Sections X.A.1.a), X.A.1.b), *supra*, for a discussion of Claim 1.

219. The multiple tubes *e*, *g*, and *h* illustrated in Thurler's FIG. 1 disclose "the multiple internal walls are formed by multiple concentric tubes having progressively larger diameters so as to form annular spaces between each adjacent tube."

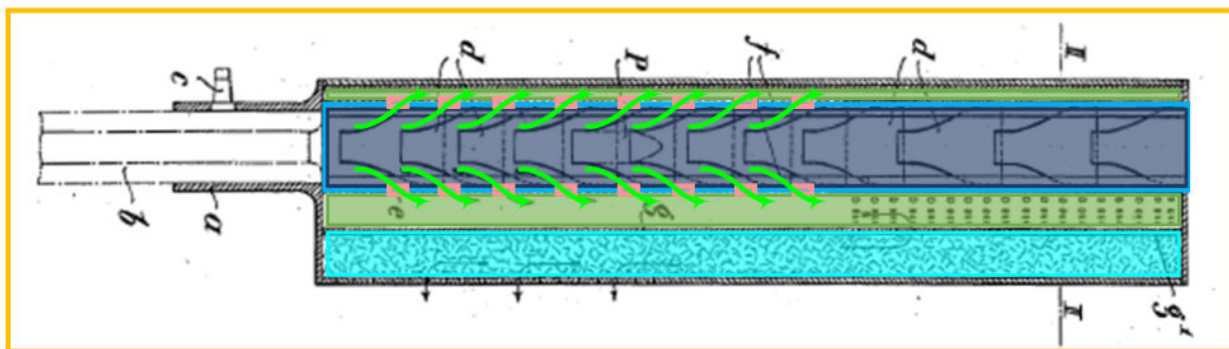
220. Additionally, Thurler's tube *g* is perforated for one-third of its length (*see* EX1015 at 2:74-75) to allow fluid to flow from the tube *g* into the outermost tube *h*. Accordingly, though Thurler explicitly discloses a single technique (perforations at an end of the tube *g*) for creating a fluid path between the second tube *g* and the outermost tube *h*, it is my opinion that Thurler's approach teaches or suggests alternative approaches to achieving this result that would have been obvious to a POSITA at the time of the '750 Patent, including at least offsetting an end of the tube *g* to allow a path at the end of tube *g* for fluid to flow from the tube *g* into the outermost tube *h*.

221. Even if Thurler fails to disclose, teach, or suggest offsetting the ends of the tubes to produce the axially serpentine fluid pathway, it is my opinion that it would have been obvious to a POSITA to modify Thurler's ESD to achieve such a configuration. Modifying Thurler's ESD to achieve such a configuration would have been a simple matter of design choice resulting from a finite number of possibilities. As of the effective filing date of the '750 Patent, the motivations for

modifying Thurler's ESD such that an end of the tube *g* is offset from an end of the tube *h* include at least seeking to simplify the machining process.

f) Claim 11.

(1) [11A] “The device of claim 10, wherein the multiple concentric tubes include an innermost tube which includes orifices oriented to allow fluid to pass from the central chamber into a first annular space adjacent the innermost tube and through the annular spaces of progressively larger diameter.”



EX1015 at FIG. 1 (annotated)

222. See Sections X.A.1.a), X.A.2.e), *supra*, for a discussion of Claims 1 and 10.

223. Thurler discloses multiple tubes *e*, *g*, and *h*, where the perforations running along the first two-thirds of the innermost tube *e* (see EX1015 at Claim 1, lns. 28-30 and FIG. 1) disclose this limitation.

g) Claim 21.

(1) [21A] “The device of claim 19, further comprising multiple internal walls defining the axially serpentine fluid pathway, the multiple internal walls being formed by multiple concentric tubes having progressively larger diameters so as to form annular spaces between each adjacent tube, and having alternating ends offset so as to produce a serpentine fluid annular pathway.”

224. See Sections X.A.1.j), X.A.2, *supra*, for a discussion of Claim 19.

225. See also Section X.A.2.e), *supra*, for a related discussion regarding Claim 10.

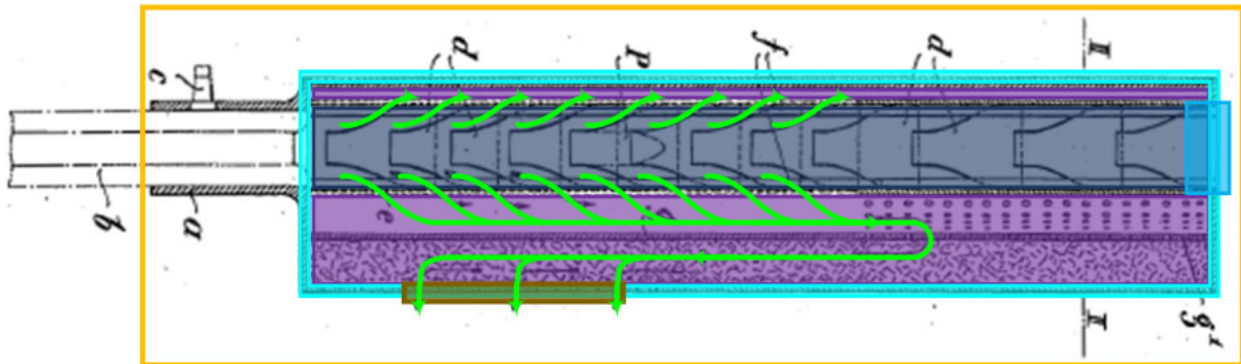
3. **GROUND 3: Thurler in view of Bouton renders Claim 18 obvious.**

a) **Claim 18.**

(1) [18A] “**The device of claim 1**, wherein **the outer shell includes an end cap assembly at an outlet end of the central chamber** and which allows **fluid to escape from the common off axis chamber through the fluid outlet**, the fluid outlet being only accessible to the fluid in the common off axis chamber.”

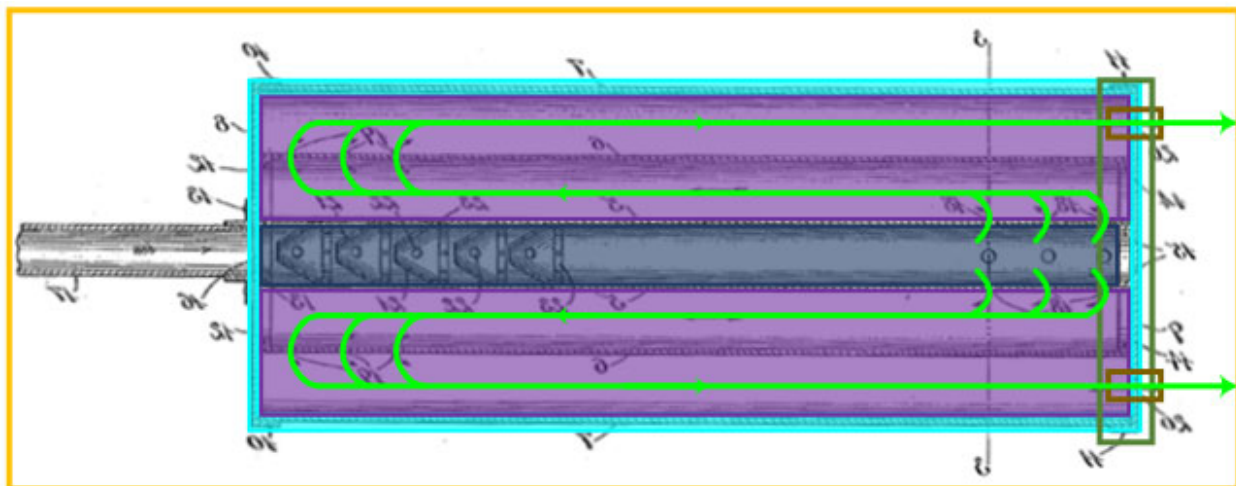
226. See Sections X.A.1.a), X.A.2, *supra*, for a discussion of Claim 1.

227. Thurler discloses an ESD having three tubes, with the innermost tube *e* forming the central chamber, and the intermediate tube *g* and outermost tube *h* forming the off axis chamber.



EX1015 at FIG. 1 (annotated)

228. As noted above, Bouton discloses a muffler ESD having concentric tubes of progressively larger diameters that are used to form an axially serpentine fluid pathway that directs fluids to exhaust out of a front end cap (referred to in Bouton as head 9).



EX1016 at FIG. 2 (annotated)

229. Thus, in view of Bouton, it is my opinion that it would have been obvious to a POSITA at the time of the invention of the '750 Patent to modify Thurler's ESD to include an additional outermost tube and to implement an endcap that allows the energy to escape from the outlet end of the central chamber — *e.g.*, to at least improve noise suppression by increasing a path length and expansion area for the deflected fluid. *See e.g.*, EX1016 at 2:99-3:8; EX1001 at 4:29-31.

230. I have provided a rendering of Thurler's ESD as modified in view of Bouton.

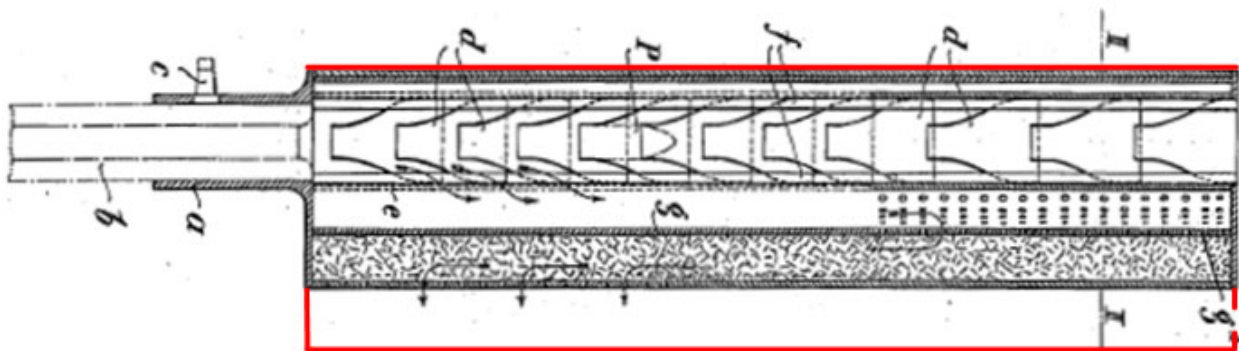


Figure 5 (Thurler's modified ESD)

231. Also, I have provided a mapping of Thurler's modified ESD to Claim 18.

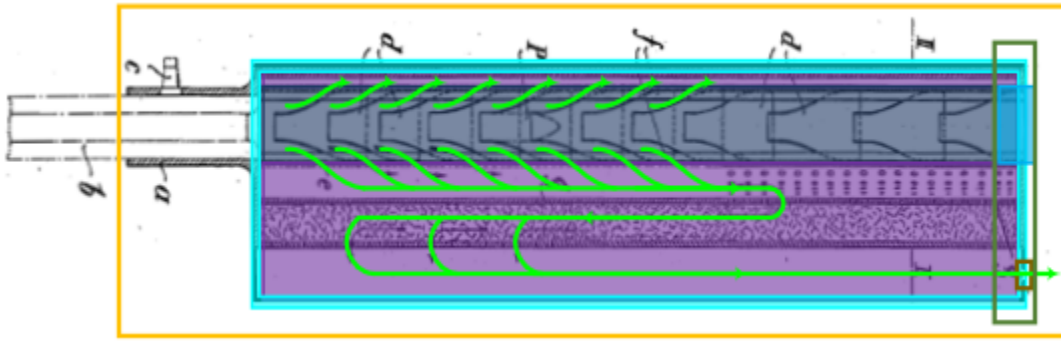


Figure 6

4. GROUND 4: Thurler in view of Barlowatz renders Claims 1, 4-17, and 19-22 obvious.

a) Claims 1, 4-11, 15-17, 19, 21, and 22.

232. See Sections X.A.1, X.A.2, *supra*, for a discussion of Claims 1, 4-11, 15-17, 19, 21, and 22.

233. If it is found that Thurler fails to anticipate or render obvious any limitations of Claims 1, 4-11, 15-17, 19, 21, and 22, it is my opinion that Thurler in view of Barlowatz renders obvious any such limitations. It is further my opinion that Thurler in view of Barlowatz renders obvious all the limitations of Claims 12-14 and 20.

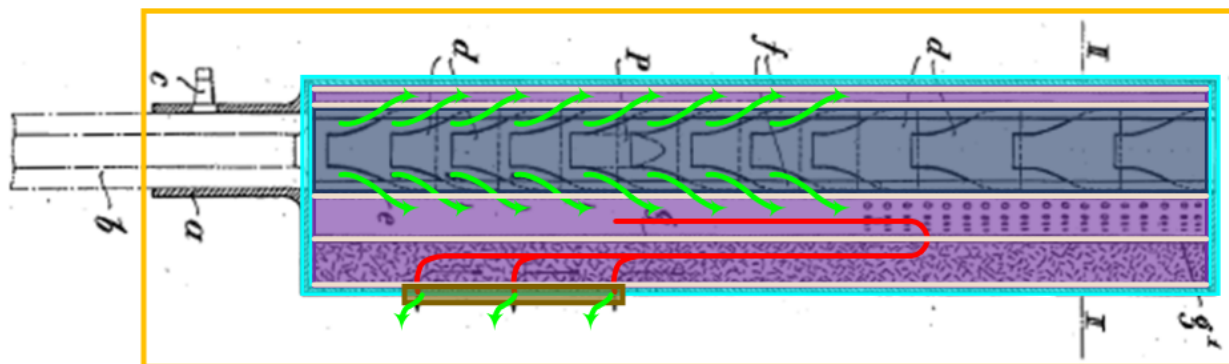
b) Claims 1 and 19 (Independent).

234. See Sections X.A.1.a), X.A.1.j), X.A.2, *supra*, for a discussion of Claims 1 and 19.

235. If it is found that Thurler fails to disclose or render obvious “a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine” fluid

pathway, it is my opinion that Thurler in view of Barlowatz renders obvious this limitation.

236. Thurler discloses a serpentine fluid pathway which is at least axially serpentine.



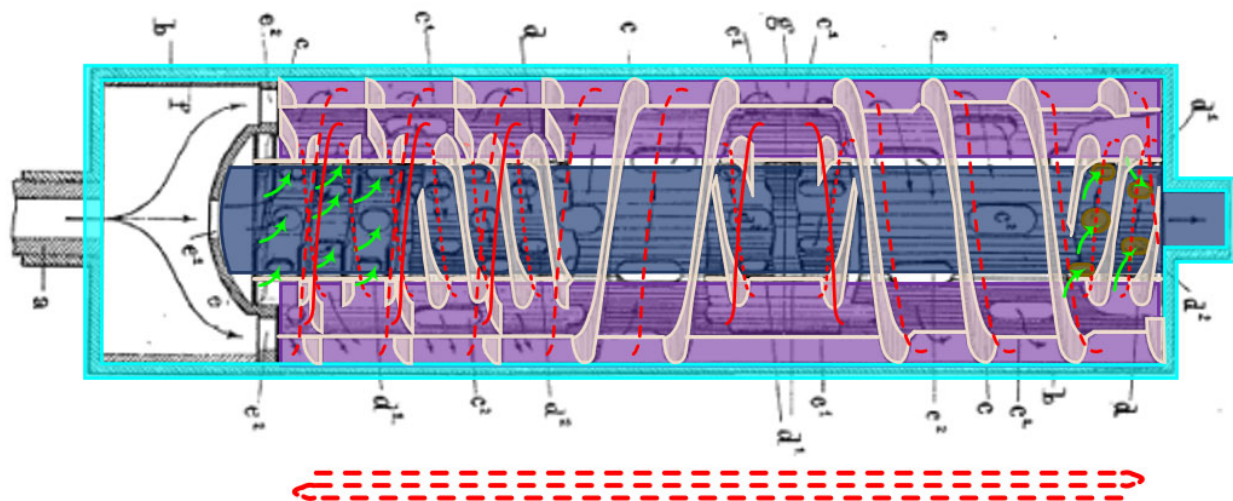
EX1015 at FIG. 1 (annotated)

237. Barlowatz discloses a fluid pathway formed by inner and outer helical coils.

EX1018 at p. 1. Each of the helical coils reverses direction approximately midway along the central chamber. *Id.* at p. 2 and FIG. 1. Also, each of the helical coils is split at a midpoint by reinforcement strips *c1* and *d1* such that each helical coil forms two helical ducts. *Id.* Together, the helical coils and strips form four helical ducts, one helical duct being formed within Barlowatz's central chamber, and the other three helical ducts being formed within Barlowatz's off axis chamber. *Id.* at p. 2.

238. Thus, in operation, Barlowatz's helical ducts form fluid pathways that would cause fluid to flow through progressively larger, and oppositely wound, helical

ducts in clockwise and counterclockwise directions. Additionally, because the helical ducts are oppositely wound, the helical ducts would cause fluid to flow in different axial directions as the fluid moves to different helical ducts — *e.g.*, the fluid would flow away from a shooter in the first helical duct, towards the shooter in the second helical duct, and away from the shooter in the third helical duct. I have represented the axial fluid pathway component of the fluid pathway through Barlowatz's ESD using the dashed line indicated below Barlowatz's ESD. *See, Id.* at FIG. 1 below.



EX1018 at FIG. 1 (annotated)

239. In view of Barlowatz, it is my opinion that it would have been obvious to a POSITA at the time of the invention of the '750 Patent to modify Thurler's ESD to include one or more helical coils (*e.g.*, Barlowatz's inner coil *d*) in one or more exterior tubes (*e.g.*, Thurler's tube *g*) thereby forming a fluid pathway that is both axially and radially serpentine. A motivation for doing so would be at least to

improve noise suppression by increasing a path length for the fluid flow and further slowing the speed of the fluid flow. *See, e.g.*, EX1016 at 2:99-3:5; EX1018 at p. 2; EX1001 at 4:29-31.

240. I have provided a rendering of Thurler's modified ESD as modified in view of Barlowatz.

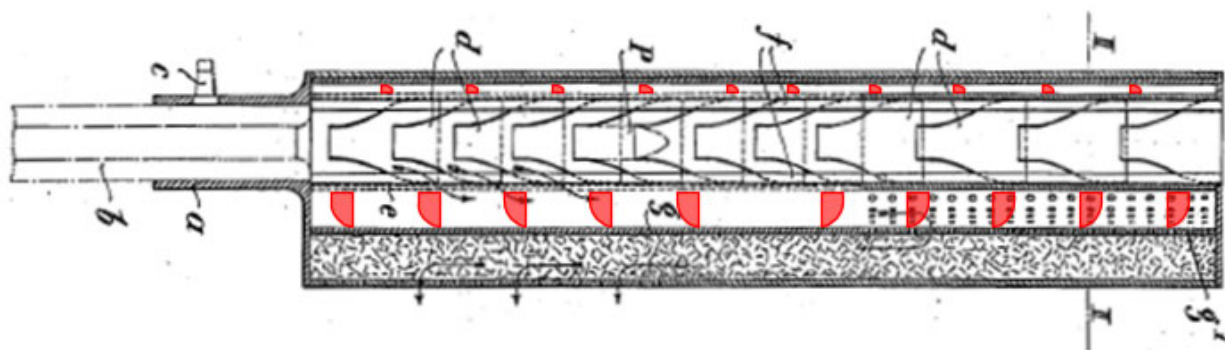


Figure 7 (Thurler's modified ESD)

241. I have also provided a mapping of Thurler's modified ESD to limitation 1B of Claim 1.

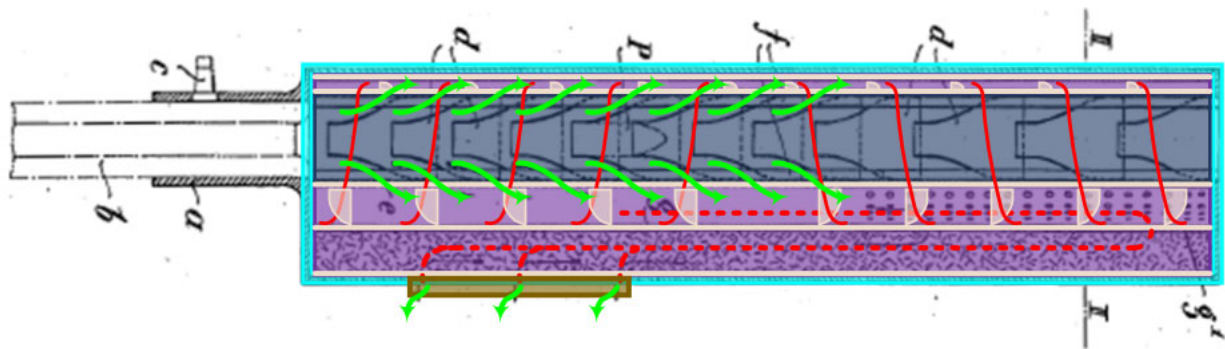


Figure 8

242. I have additionally provided a representation of radially serpentine fluid flow through Thurler's modified ESD.

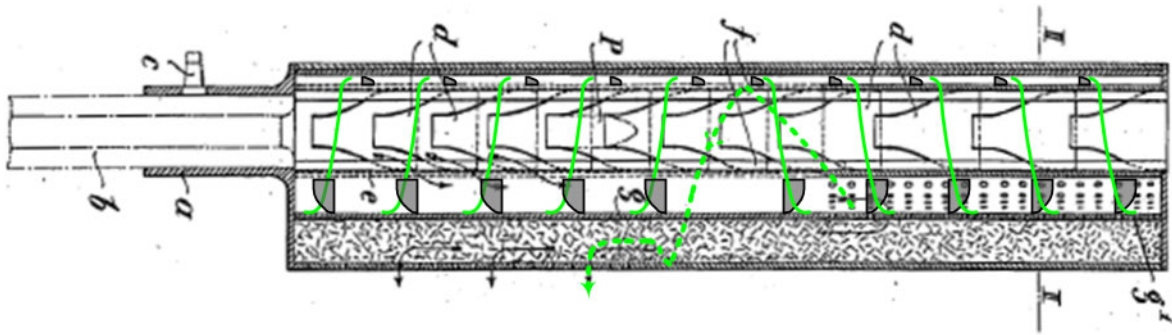


Figure 9 (radially serpentine fluid flow in Thurler's modified ESD)

c) Claim 9.

(1) [9A] “**The device of claim 1**, wherein **the multiple internal walls are formed to produce a radially serpentine fluid pathway.**”

243. See Sections X.A.1.a), X.A.1.a)(3), X.A.2, X.A.4.a), *supra*, for a related discussion with reference to Claim 1.

d) Claim 12.

(1) [12A] “**The device of claim 11**, wherein **the annular spaces further include a helical wall oriented within at least one of the annular spaces to direct fluids along a helical path within the at least one annular space.**”

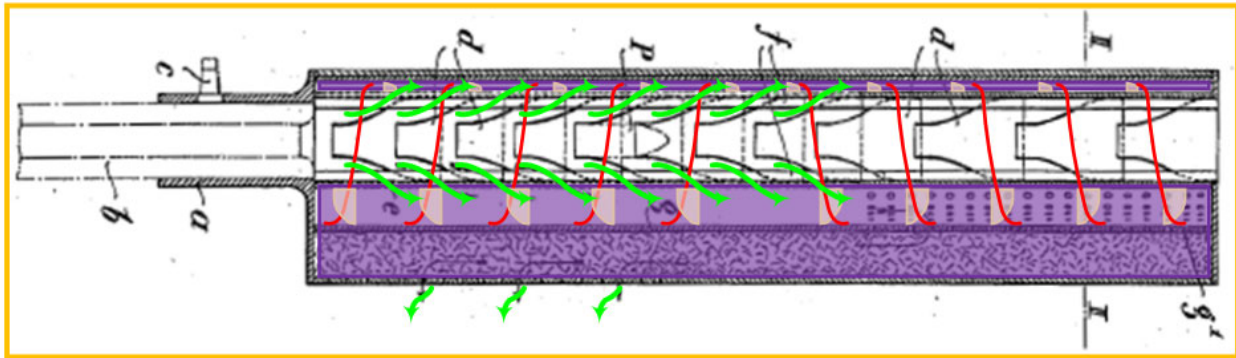


Figure 10 (mapping to Thurler's modified ESD)

244. See Sections X.A.1.a), X.A.2, X.A.4.a), X.A.2.e), X.A.2.f), *supra*, for a discussion of Claims 1, 10, and 11.

245. Thurler's tube *g* including the helical wall that directs fluid through a helical path within Thurler's tube *g* discloses "the annular spaces further include a helical wall oriented within at least one of the annular spaces to direct fluids along a helical path within the at least one annular space."

e) Claim 13.

(1) [13A] "The device of claim 12, wherein the helical wall has a quadrilateral cross-section or a circular cross-section."

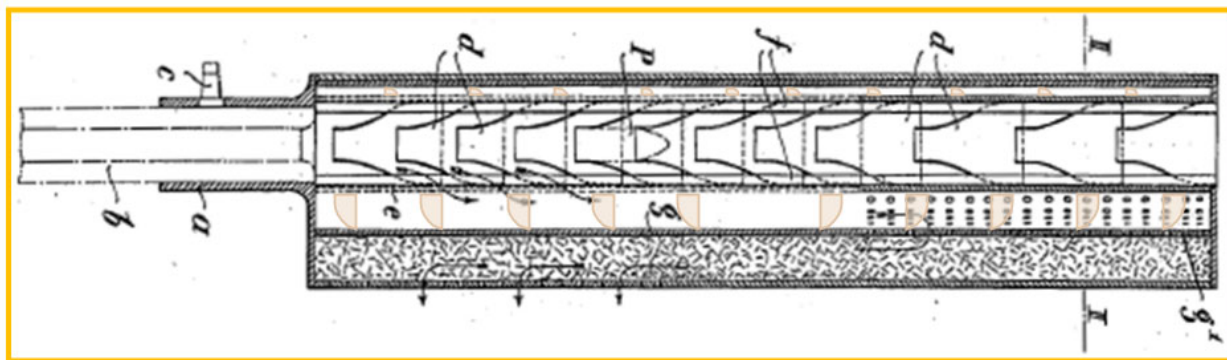


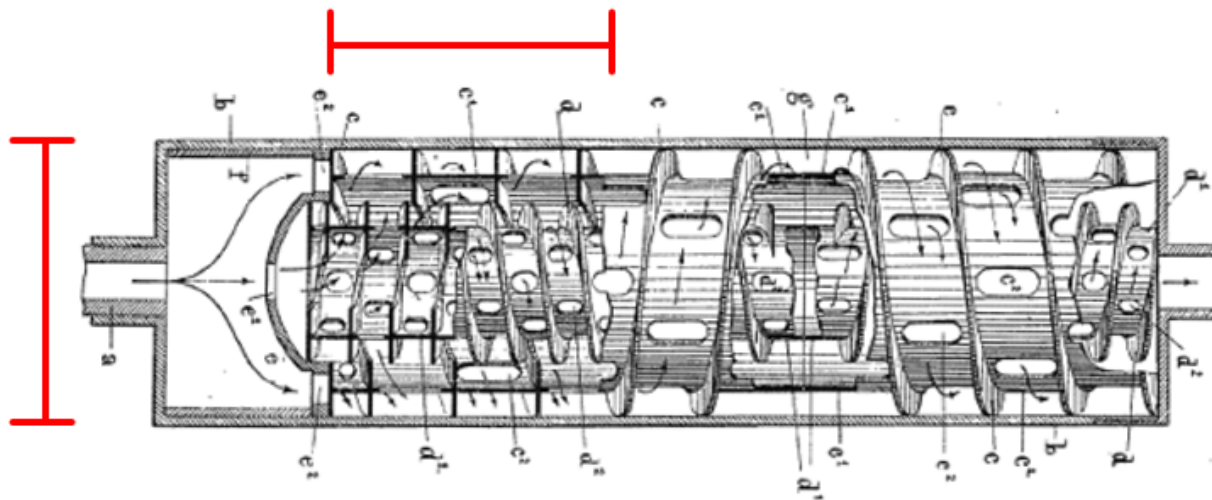
Figure 11 (mapping to Thurler's modified ESD)

246. See Sections X.A.1.a), X.A.2, X.A.4.a), X.A.2.e), X.A.4.d), *supra*, for a discussion of Claims 1, 10, 11, and 12.

247. The helical walls that travel around Thurler's tube *g* have a circular cross-section.

f) Claim 14.

(1) [14A] “The device of claim 12, wherein the helical wall has a winding ratio (windings:diameter) of about 3:1 to about 8:1.”



EX1018 at FIG. 1 (annotated)

248. See Sections X.A.1.a), X.A.2, X.A.4.a), X.A.2.e), X.A.4.d) *supra* for a discussion of Claims 1, 10, 11, and 12.

249. As can be seen from Barlowatz's FIG. 1, the helical walls have around four turns within a width of Barlowatz's ESD (*i.e.*, around a 4:1 windings:diameter ratio).

g) Claim 20.

(1) [20A] “**The device of claim 19, wherein the common off axis chamber further comprises at least one helical wall defining the axially serpentine fluid pathway, the at least one helical wall being configured to produce an axially serpentine fluid pathway which**

helically spirals around the central chamber and which dissipates energy transferred from the high energy material."

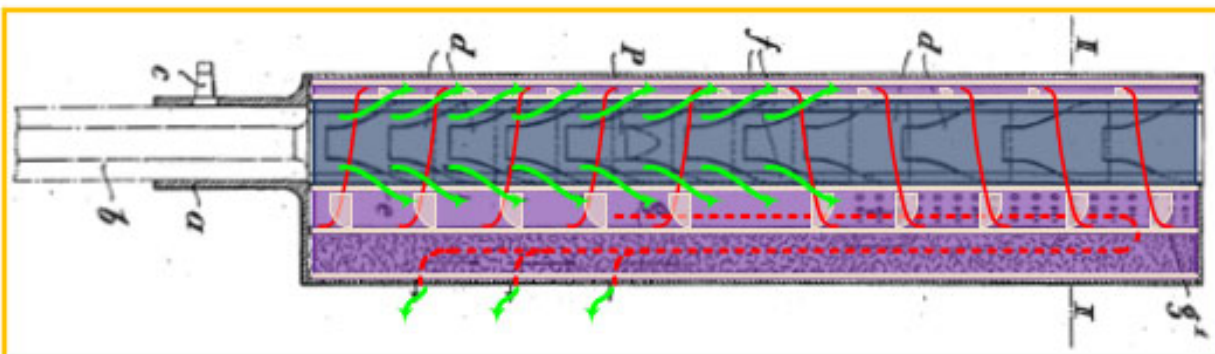


Figure 12 (mapping to Thurler's modified ESD)

250. See Sections X.A.1.j), X.A.2, X.A.4.a), *supra*, for a discussion of Claim 19

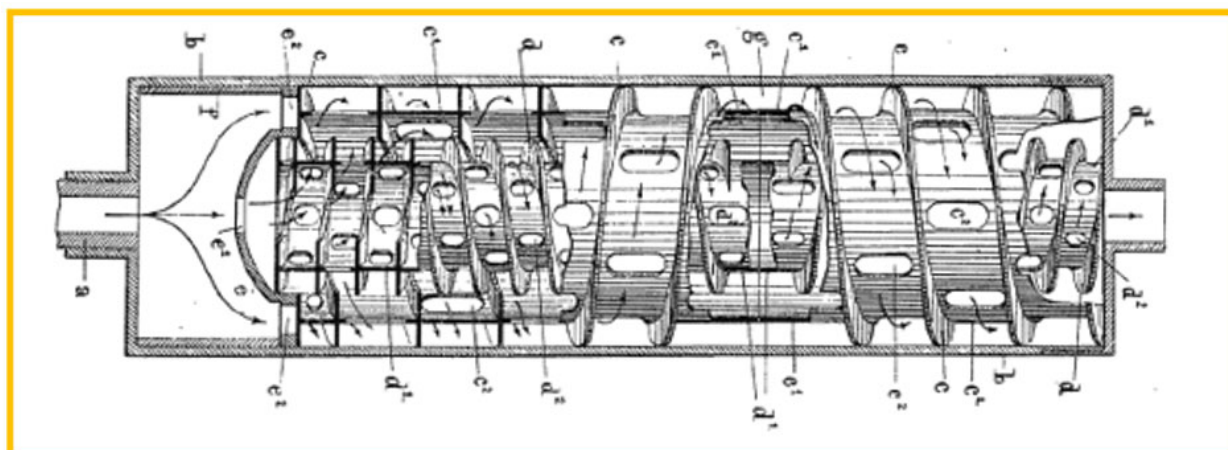
251. The helical wall in Thurler's tube *g* causes fluid within Thurler's tube *g* to helically spiral around Thurler's tube *e* thereby disclosing "the common off axis chamber further comprises at least one helical wall defining the axially serpentine fluid pathway, the at least one helical wall being configured to produce an axially serpentine fluid pathway which helically spirals around the central chamber and which dissipates energy transferred from the high energy material."

5. GROUND 5: Barlowatz anticipates Claims 1, 9, 19, and 20.

252. Barlowatz discloses all the limitations of Claims 1, 9, 19, and 20.

a) Claim 1 (Independent).

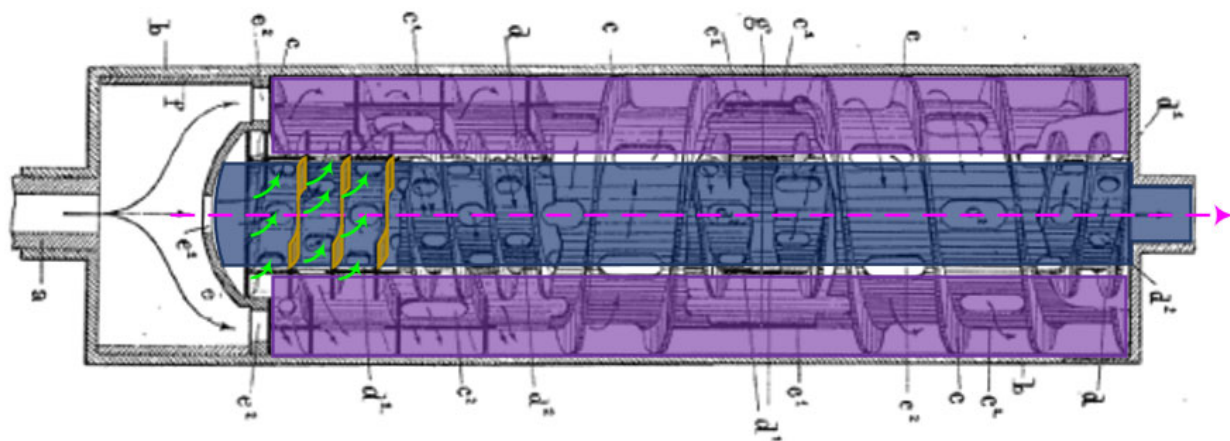
(1) [1Pre] **“An energy capture and control device, comprising:”**



EX1018 at FIG. 1 (annotated)

253. Barlowatz is related to “silencer device[s], particularly applicable to firearms.” EX1018 at 1:1-2. Barlowatz’s ESD is one such device and discloses the “energy capture and control device.”

(2) [1A] **“a) a central chamber oriented along a central axis within an outer shell, said central chamber having an inlet configured to receive a high energy material from a high energy outlet;”**

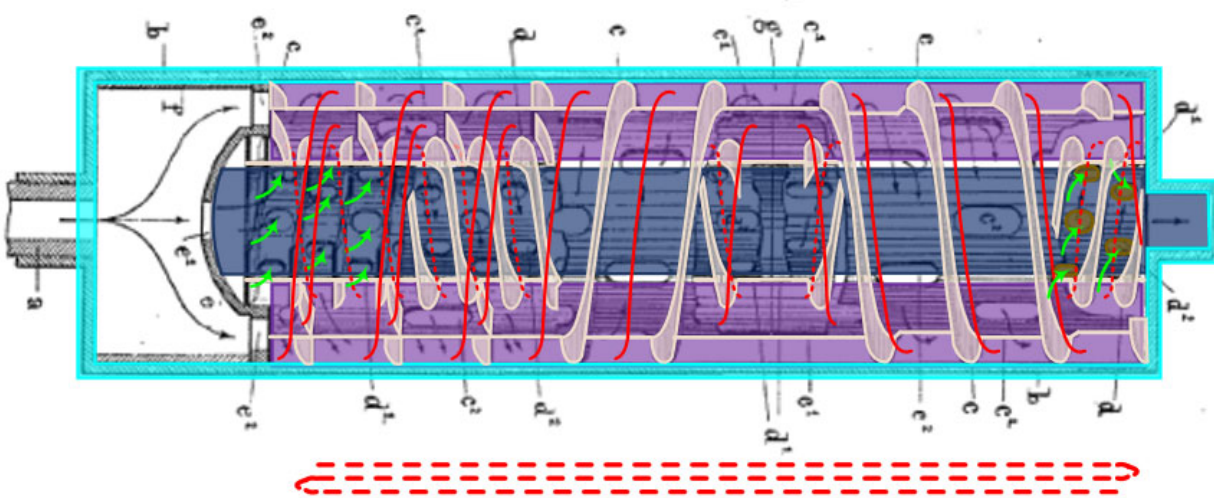


EX1018 at FIG. 1 (annotated)

254. The space within Barlowatz's inner coil *d* discloses "the central chamber."

The axis through Barlowatz's inner coil *d* discloses the "central axis." Barlowatz's sleeve *b* discloses the "outer shell." And the hole *e1* in the center of Barlowatz's cap *e* discloses the "central chamber having an inlet configured to receive a high energy material from a high energy outlet."

(3) [1B] "b) a common off axis chamber oriented within the outer shell in fluid communication with the central chamber and having a fluid outlet and multiple internal walls defining a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine and which dissipates energy transferred from the high energy material; and"



EX1018 at FIG. 1 (annotated)

255. As noted in Section X.A.4.a), *supra*, Barlowatz's coils *c* and *d* and strips *c1* and *d1* disclose three progressively larger helical ducts within Barlowatz's off axis chamber that are oppositely wound.

256. Applying the ordinary and customary meaning that a serpentine fluid pathway that causes "back and forth" fluid flow requires multiple changes in direction (*See*

Section VIII.A.4 *supra*), the aspect of Barlowatz's fluid pathway that extends back and forth through the helical ducts in Barlowatz's off axis chamber discloses "a serpentine fluid pathway which is . . . axially serpentine." For instance, the innermost helical duct in Barlowatz's off axis chamber will cause gas that escapes from Barlowatz's central chamber to travel in a first (*e.g.*, forward) direction on its path to perforations in the innermost helical duct before entering the intermediate helical duct, which will cause the gas to travel back in a second (*e.g.*, backwards) direction on its path to perforations in the intermediate helical duct before entering the outermost helical duct, which will cause the gas to travel forth in the first direction on its path to perforations in the outermost helical duct.

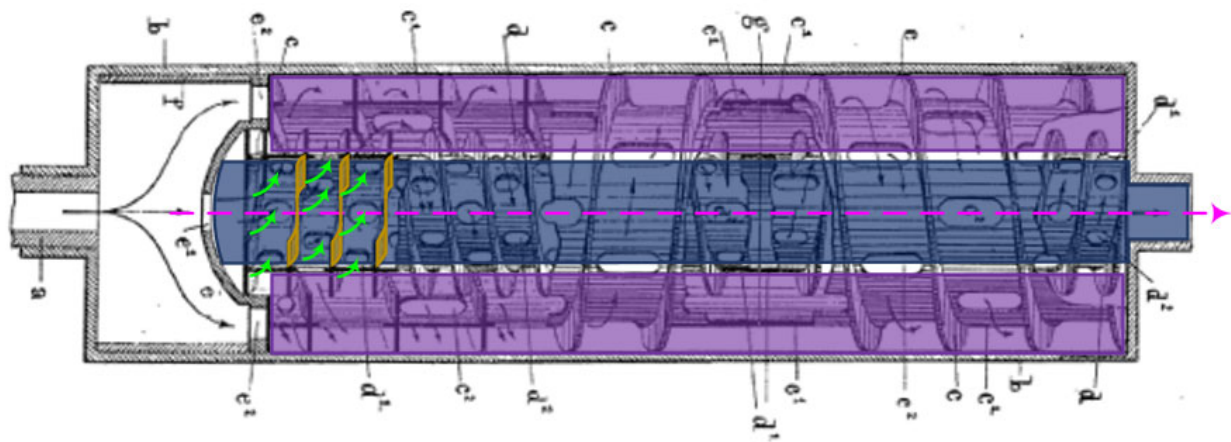
257. Additionally, the aspect of Barlowatz's fluid pathway that extends radially through the progressively larger helical ducts discloses "a serpentine fluid pathway which is . . . radially serpentine." For instance, the innermost helical duct will cause gas to travel in a first (*e.g.*, clockwise) direction before extending radially outward into the intermediate helical duct, which will cause the gas to travel back in a second (*e.g.*, counterclockwise) direction before extending radially outward into the outermost helical duct, which will cause the gas to travel forth in the first direction.

258. I understand that in the related litigation, patent owner has taken the position that a serpentine fluid pathway requires a single change of direction (*See* EX1034

at p. 4). While I disagree with this interpretation of the meaning of that claim term Barlowatz's ESD nevertheless discloses "a serpentine fluid pathway which is . . . axially serpentine and radially serpentine."

259. I further understand that in the related litigation, patent owner has taken the position that "a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine" means a serpentine fluid pathway which is axially serpentine or radially serpentine. *See* EX1033 at pp. 3, 4, 6. While I disagree with this interpretation, Barlowatz nevertheless anticipates this limitation as Barlowatz discloses an axially serpentine fluid pathway, a radially serpentine pathway, or both.

(4) [1C] "c) a plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber."



EX1018 at FIG. 1 (annotated)

260. At least the first two interior turns of Barlowatz's inner coil *d*, which, in operation, would deflect energy to the space between the inner coil *d* and the outer coil *c*, disclose "a plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber."

b) Claim 9.

(1) [9A] "The device of claim 1, wherein the multiple internal walls are formed to produce a radially serpentine fluid pathway."

261. See Section X.A.5.a)(3), *supra*, for a related discussion with reference to Claim 1.

c) Claim 19 (Independent).

(1) [19Pre]

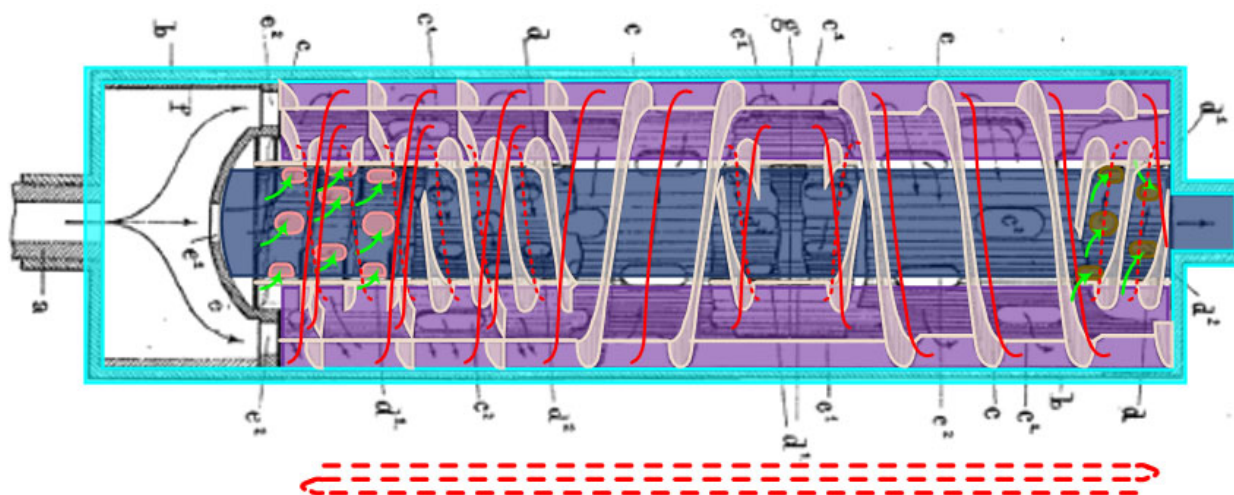
262. See Section X.A.5.a)(1), *supra*, for a discussion of this limitation.

(2) [19A]

263. See Section X.A.5.a)(2), *supra*, for a discussion of this limitation.

(3) [19B] "b) a common off axis chamber oriented within the outer shell in fluid communication with the central chamber via a plurality of orifices and further includes a fluid outlet, the common off axis chamber comprising a serpentine fluid pathway

**which is at least one of axially serpentine and radially serpentine;
and”**



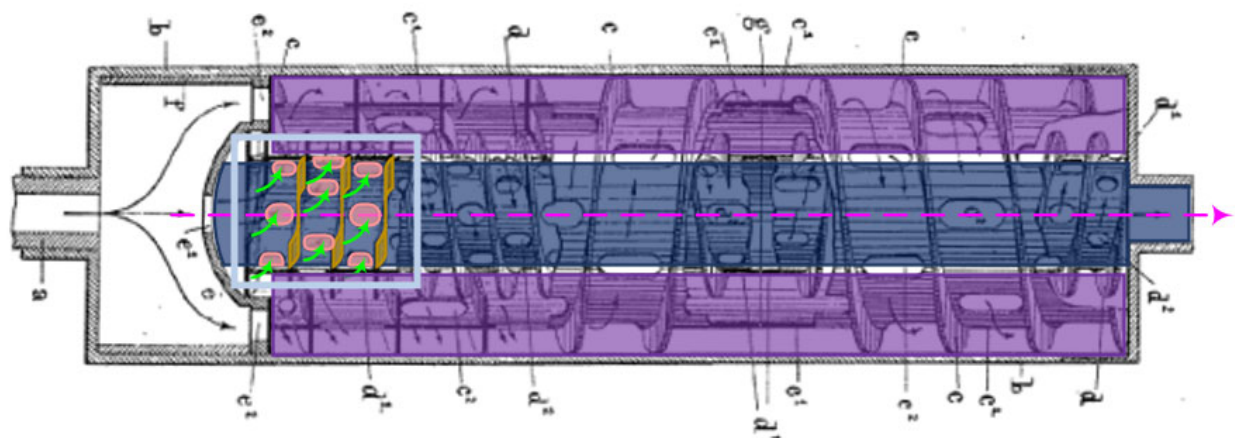
EX1018 at FIG. 1 (annotated)

264. See Section X.A.5.a)(3), *supra*, for a discussion of this limitation.

265. The perforations running along Barlowatz's inner coil *d* disclose the “plurality of orifices.” See EX1018 at Claim 1, lns. 28-30. Barlowatz's ESD device discloses all the remaining elements recited in the above limitation. See Section X.A.5.a)(3), *supra*.

(4) [19C] “c) **a plurality of deflectors oriented in series along the central axis of the central chamber, wherein a position of multiple individual deflectors of the plurality of deflectors**

corresponds with the individual orifices of the plurality of orifices to the common off axis chamber.”



EX1018 at FIG. 1 (annotated)

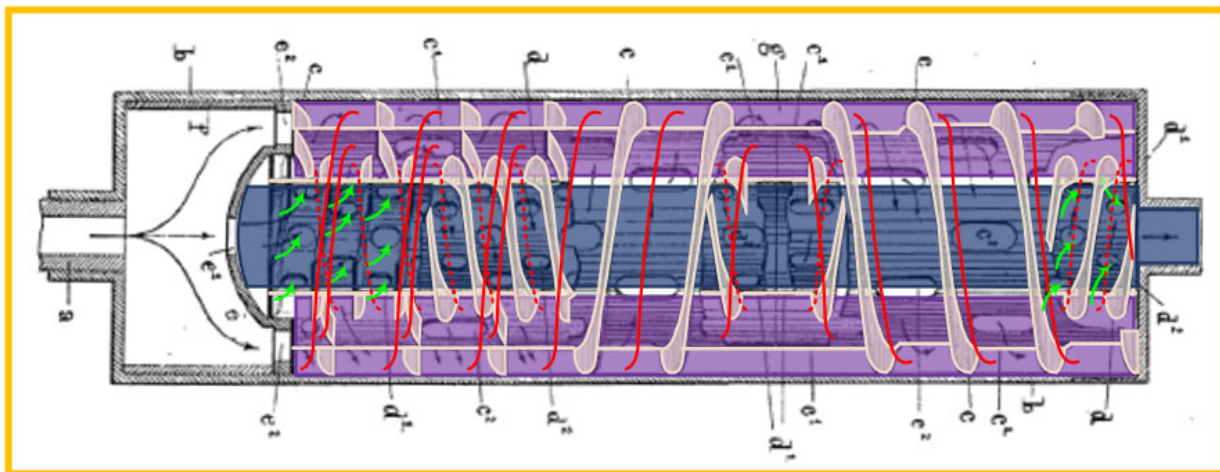
266. See Section X.A.5.a)(4), *supra*, for a discussion of aspects of this limitation.

267. The portions of Barlowatz's inner coil *d* located within Barlowatz's central chamber that deflect the energy to the space between inner coil *d* and outer coil *c* disclose "a position of multiple individual deflectors of the plurality of deflectors corresponds with the individual orifices of the plurality of orifices to the common off axis chamber." Barlowatz's ESD device discloses all the remaining elements recited in the above limitation. *See* Section X.A.5.a)(4), *supra*.

d) Claim 20.

(1) [20A] “The device of claim 19, wherein the common off axis chamber further comprises at least one helical wall defining the axially serpentine fluid pathway, the at least one helical wall being configured to produce an axially serpentine fluid pathway which

helically spirals around the central chamber and which dissipates energy transferred from the high energy material."



EX1018 at FIG. 1 (annotated)

268. See Section X.A.5.c), *supra*, for a discussion of Claim 19.

269. Barlowatz's coils *c* and *d*, which are fluidly connected and direct energy in opposing axially helical directions, disclose "the common off axis chamber further comprises at least one helical wall defining the axially serpentine fluid pathway, the at least one helical wall being configured to produce an axially serpentine fluid pathway which helically spirals around the central chamber and which dissipates energy transferred from the high energy material."

6. GROUND 6: Barlowatz renders Claims 1, 9, 19, and 20 obvious.

270. See Section X.A.5, *supra*, for a discussion of Claims 1, 9, 19, and 20.

271. To the extent it is found that Barlowatz fails to disclose any limitations of Claims 1, 9, 19, and 20, it is my opinion that Barlowatz renders obvious any such limitations.

7. GROUND 7: Barlowatz in view of Reeves renders Claim 2 obvious.

a) Claim 2.

(1) [2A] “The device of claim 1, wherein the common off axis chamber comprises a plurality of sub-chambers defined by the plurality of deflectors, each with the radially serpentine fluid pathway, and wherein the radially serpentine fluid pathways of each of the deflectors are axially non-linearly interconnected along an outermost portion of the plurality of sub-chambers.”

272. See Sections X.A.5.a), 252 *supra* for a discussion of Claim 1.

273. As I note in Section X.A.5.a) *supra*, Barlowatz discloses “a serpentine fluid pathway which is . . . radially serpentine.” As I also note in Section X.A.4.a) *supra*, Barlowatz further discloses that the coils are oppositely wound at a midpoint to force the gases to change direction.

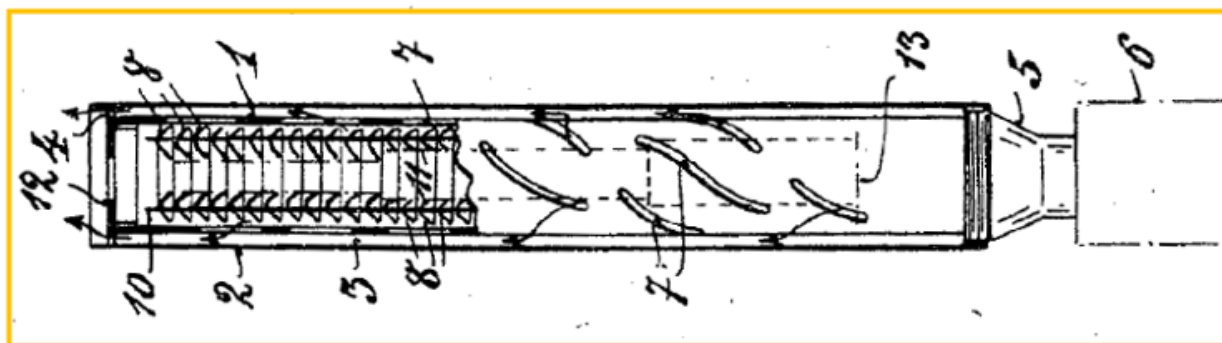
274. Reeves discloses a series of compartments that each include encapsulated shells forming “radially serpentine fluid pathways,” where the encapsulated shells are connected by an outermost opening 4. See EX1019 at FIG. 1, 2:40-53, 85-93. Reeves also discloses that it would be obvious to perforate the partitions at opposite ends to increase the path length. Thus, it would have been obvious to a POSITA to modify Barlowatz's ESD to be partitioned into three chambers that

are connected along alternating outermost points, thereby disclosing the above limitation.

8. **GROUND 8: Eichenseher in view of Barlowatz renders obvious Claims 1, 3, 4, 5, 8, 9, 18, and 19.**

a) **Claim 1 (Independent).**

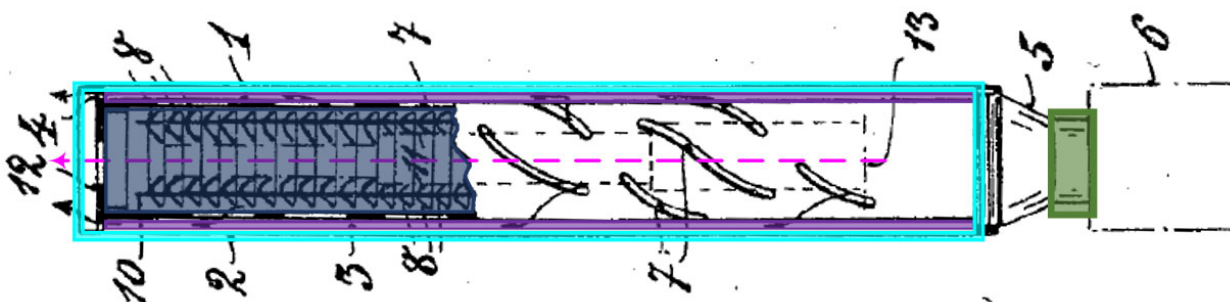
(1) [1Pre] “**An energy capture and control device, comprising:**”



EX1021 at FIG. 1 (annotated)

275. Eichenseher discloses “silencers for firearms.” EX1018, at 1:1-2. The device illustrated in Eichenseher’s FIG. 1 is one such device and discloses the “energy capture and control device.”

(2) [1A] “a) **a central chamber oriented along a central axis within an outer shell, said central chamber having an inlet configured to receive a high energy material from a high energy outlet;**”



EX1021 at FIG. 1 (annotated)

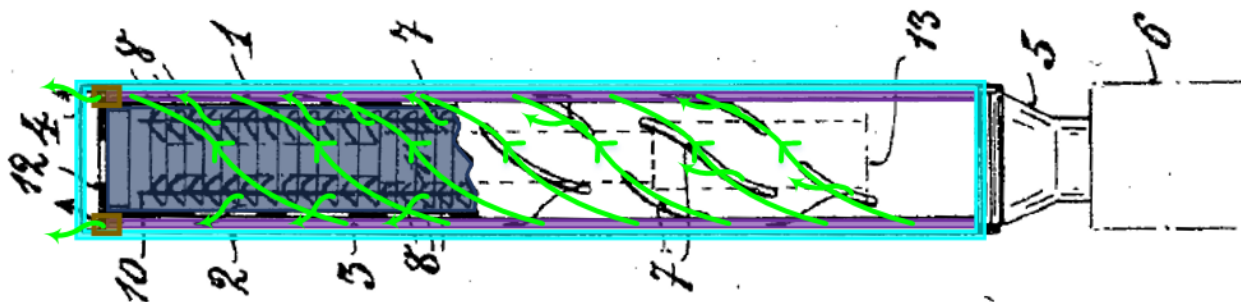
276. The space within Eichenseher's cylinder 1 discloses "the central chamber."

The axis through Eichenseher's cylinder 1 discloses the "central axis."

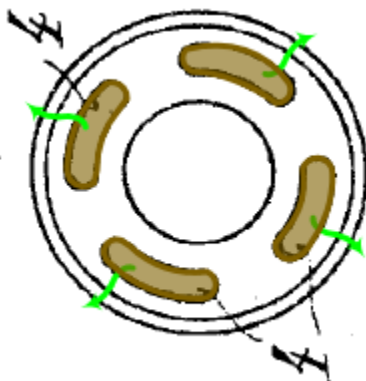
Eichenseher's cylinder 2 discloses the "outer shell." And the cylindrical portion between Eichenseher's mouthpiece 5 and Eichenseher's rifle barrel 6 discloses the "central chamber having an inlet configured to receive a high energy material from a high energy outlet."

(3) [1B] "b) a common off axis chamber oriented within the outer shell in fluid communication with the central chamber and having a fluid outlet and multiple internal walls defining a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine and which dissipates energy transferred from the high energy material; and"

277. Eichenseher's ESD discloses an ESD having two concentric tubes, with the inner cylinder 1 forming a central chamber and the outer cylinder 2 forming an off-axis chamber.

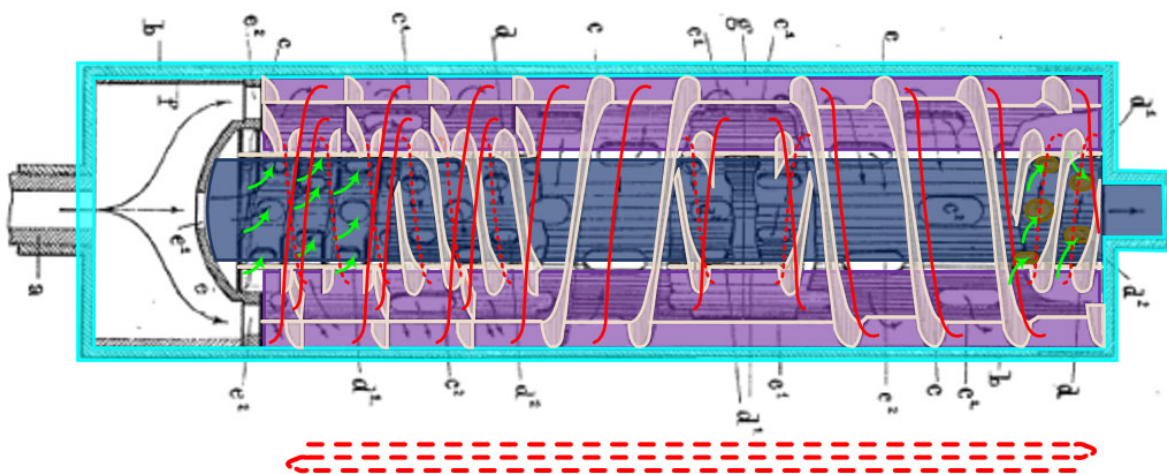


EX1021 at FIG. 1 (annotated)



EX1021 at FIG. 2 (annotated)

278. Barlowatz discloses an ESD having concentric coils, with Barlowatz's inner coil *d* forming a central chamber and an exterior of Barlowatz's inner coil *d* and an interior of Barlowatz's sleeve *b* forming an off-axis chamber. Barlowatz further discloses that Barlowatz's inner coil *d* and Barlowatz's outer coil *d* form helical ducts which change directions at a midway point to force the fluid to change directions, to further reduce the speed of the fluid flow. See EX1018 at p. 2, FIG. 1, below.



EX1018 at FIG. 1 (annotated)

279. As such, in view of Barlowatz's disclosures, it would have been obvious to a POSITA at the time of the invention of the '750 Patent to modify Eichenseher's ESD to include an outer coil (*e.g.*, Barlowatz's outer coil *c*) in Eichenseher's cavity 3 that forms a first helical channel extending around the inner cylinder 1 in a first direction¹⁷ (*e.g.*, clockwise) and a second helical channel extending around the inner cylinder 1 in an opposing direction¹⁸ (*e.g.*, counterclockwise). For example, a motivation to modify would include at least the motivation to improve noise suppression by increasing a path length for the deflected fluid and further slowing the speed of the fluid flow. *See, e.g.*, EX1016 at 2:99-3:5, EX1018 at p. 2; EX1001 at 4:29-31. I have included a rendering of Eichenseher's modified ESD (in view of Barlowatz) and a mapping of the same to the above limitation below.

¹⁷ *See* EX1009 at FIG. 1; EX1022 at p. 1; EX1023 at p. 14; EX1024 at FIG. 1; EX1025 at FIG. 1; EX1026 at FIGs. 1, 4, 5; and EX1027 at FIGs. 1, 10, 14 (each supporting the concept of implementing, within an outer chamber, a helical channel that extends around an inner chamber).

¹⁸ *See* EX1023 at p. 14; EX1024 at FIG. 1, 2:35-52; EX1025 at FIG. 1; EX1027 at FIG. 14, 11:31-47, (each supporting the concept of implementing, within an outer chamber, a first helical channel that extends around an inner chamber in a first direction in series with a second helical channel that extends around the inner chamber in an opposing direction).

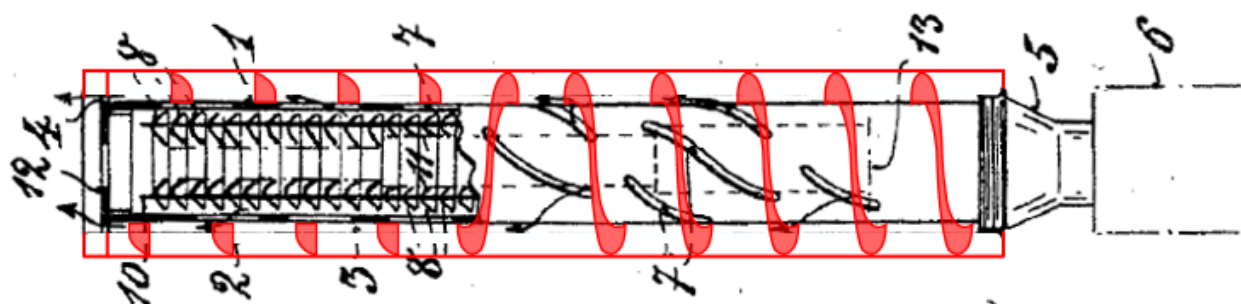


Figure 13 (Eichenseher's modified ESD)

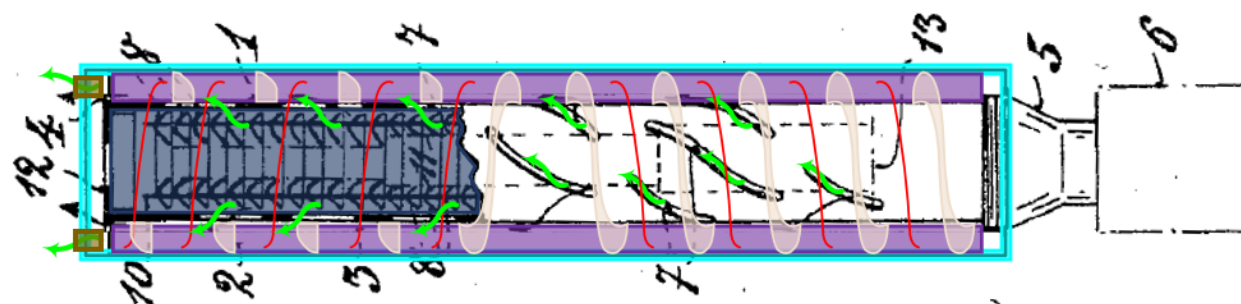


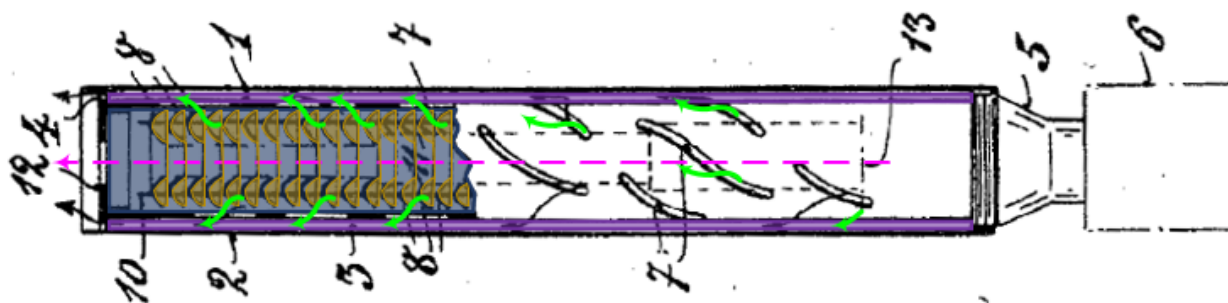
Figure 14 (mapping to Eichenseher's modified ESD)

280. I understand that in the related litigation, patent owner has taken the position that a “radially serpentine” fluid pathway is simply a pathway that causes fluid to change direction (e.g., from clockwise to counterclockwise). *See* EX1033 at p. 4. While I disagree with this interpretation, the fluid pathway in Eichenseher’s modified ESD nevertheless discloses “a serpentine fluid pathway which is . . . radially serpentine” under this interpretation.

281. I further understand that in the related litigation, patent owner has taken the position that “a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine” is a serpentine fluid pathway which is axially serpentine or radially serpentine. *See* EX1033 at pp. 3, 4, 6. While I disagree with this

interpretation, Eichenseher, in view of Barlowatz, nevertheless renders obvious Claim 1 as Eichenseher, in view of Barlowatz, renders obvious a radially serpentine pathway, under this interpretation.

(4) [1C] “c) a plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber.”



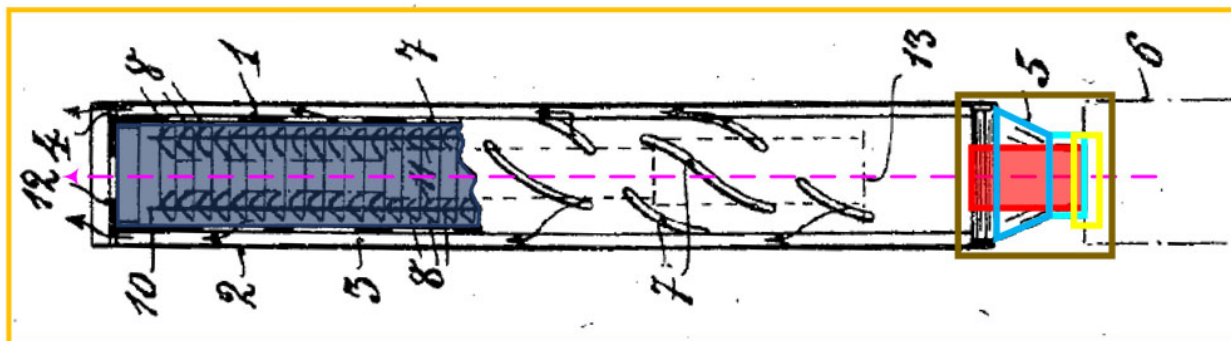
EX1021 at FIG. 1 (annotated)

282. At least Eichenseher's first two silencers 8, which are configured to deflect energy to Eichenseher's outer cylinder 2, disclose the “plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber.”

b) Claim 3.

(1) [3A] “The device of claim 1, wherein the central chamber further comprises a locking block oriented at the inlet, said locking block having an engagement surface configured to attach to the high energy outlet and a hollow interior along the central

axis, said hollow interior having a reducing throat portion and a flared outlet."



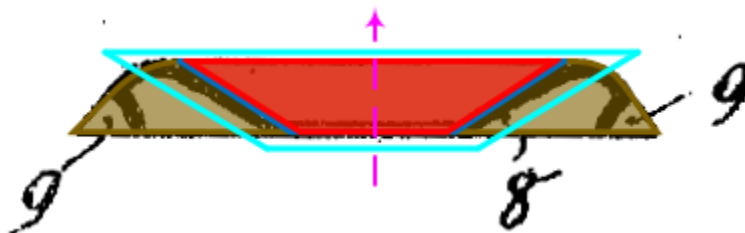
EX1021 at FIG. 1 (annotated)

283. See Section X.A.8.a), *supra*, for a discussion of Claim 1.

284. Eichenseher's mouthpiece 5, which is used to screw the double-walled hollow body 1 and 2 to the rifle barrel 6 and includes a hollow interior, a reduced throat portion, and a flared exit discloses "the central chamber further comprises a locking block oriented at the inlet, said locking block having an engagement surface configured to attach to the high energy outlet and a hollow interior along the central axis, said hollow interior having a reducing throat portion and a flared outlet."

c) Claim 4.

- (1) [4A] “The device of claim 1, wherein **the plurality of deflectors each comprise a frustoconical shape having a hollow interior along the central axis and a flared exit portion.**”



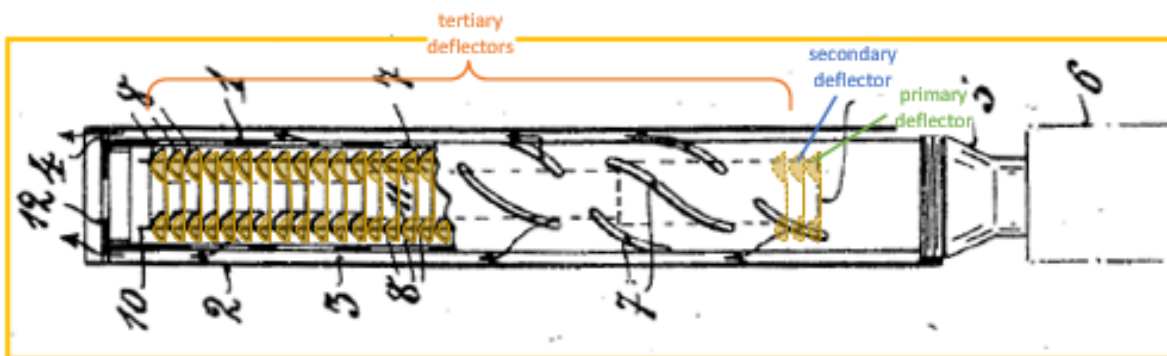
EX1021 at FIG. 4 (annotated)

285. See Section X.A.8.a), *supra*, for a discussion of Claim 1.

286. Thurler's silencer 8 having a hollow interior and a flared exit portion discloses “the plurality of deflectors each comprise a frustoconical shape having a hollow interior along the central axis and a flared exit portion.”

d) Claim 5.

- (1) [5A] “**The device of claim 4, wherein the plurality of deflectors include a primary deflector, a secondary deflector, and at least one tertiary deflector.**”

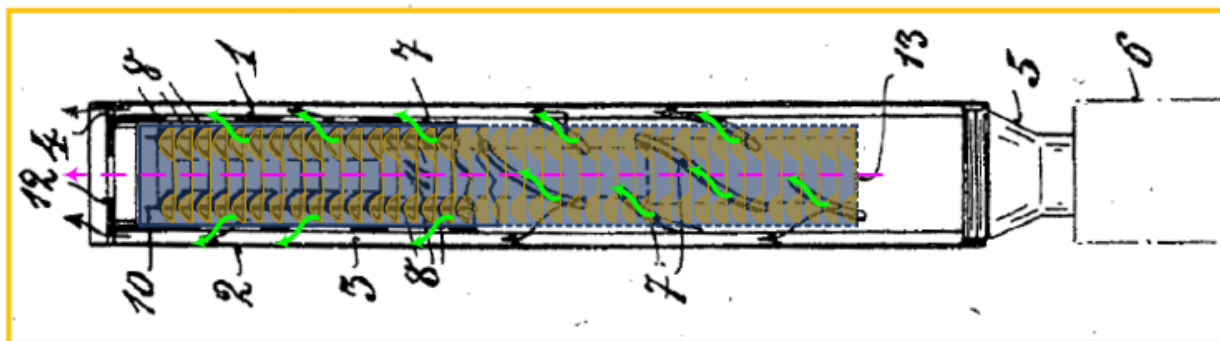


EX1021 at FIG. 1 (annotated)

287. See Sections X.A.8.a), X.A.8.c), *supra*, for a discussion of Claims 1 and 4.

e) **Claim 8.**

(1) [8A] “**The device of claim 4**, wherein **the plurality of deflectors span substantially the entire central axis along the central chamber.**”



EX1021 at FIG. 1 (annotated)

288. See Sections X.A.8.a), X.A.8.c), *supra*, for a discussion of Claims 1 and 4.

289. Eichenseher's slots 7 run a length of Eichenseher's ESD, thereby allowing all (or substantially all) of Eichenseher's silencers 8 to deflect gas from the central chamber to the off axis chamber, thereby disclosing “the plurality of deflectors span substantially the entire central axis along the central chamber.”

f) **Claim 9.**

(1) [9A] “**The device of claim 1**, wherein **the multiple internal walls are formed to produce a radially serpentine fluid pathway.**”

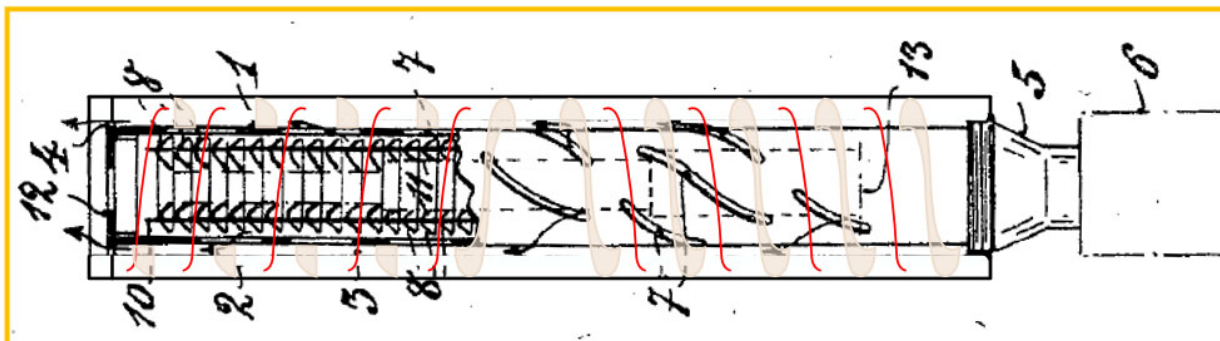


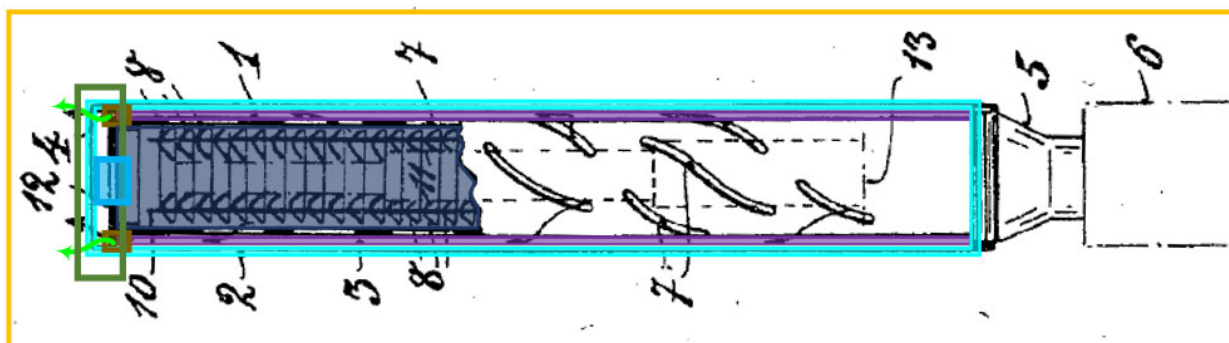
Figure 15 (mapping to Eichenseher's modified ESD)

290. See Section X.A.8.a), *supra*, for a related discussion with reference to Claim

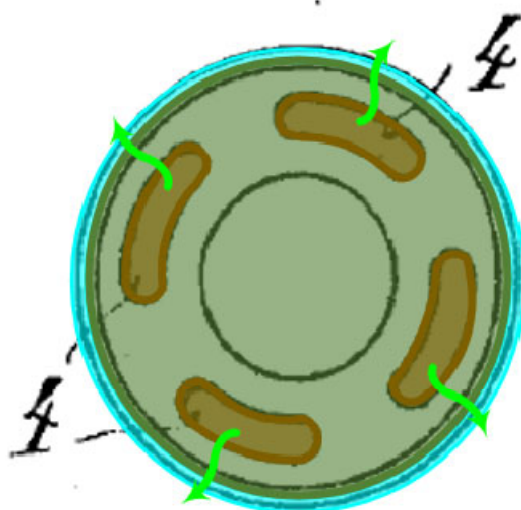
1.

g) Claim 18.

(1) [18A] “The device of claim 1, wherein the outer shell includes an end cap assembly at an outlet end of the central chamber and which allows fluid to escape from the common off axis chamber through the fluid outlet, the fluid outlet being only accessible to the fluid in the common off axis chamber.”



EX1021 at FIG. 1 (annotated)



EX1021 at FIG. 2 (annotated)

291. See Section X.A.8.a) *supra* for a discussion of Claim 1.

292. Eichenseher's slots 4 provided at the top in the ring closing off Eichenseher's cavity 3, through which powder gases can escape, disclose "the outer shell includes an end cap assembly at an outlet end of the central chamber and which allows fluid to escape from the common off axis chamber through the fluid outlet, the fluid outlet being only accessible to the fluid in the common off axis chamber."

h) Claim 19 (Independent).

(1) [19Pre]

293. See Section X.A.8.a)(1), *supra*, for a discussion of this limitation.

(2) [19A]

294. See Section X.A.8.a)(2), *supra*, for a discussion of this limitation.

(3) [19B] "b) a common off axis chamber oriented within the outer shell in fluid communication with the central chamber via a plurality of orifices and further includes a fluid outlet, the common off axis chamber comprising a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine; and"

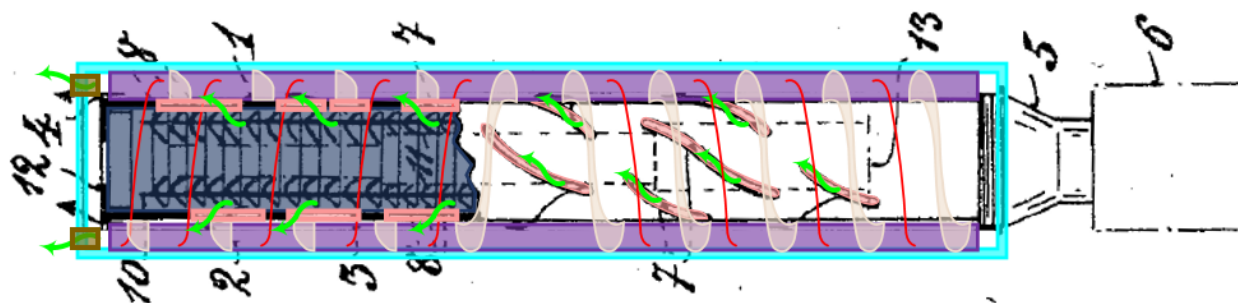


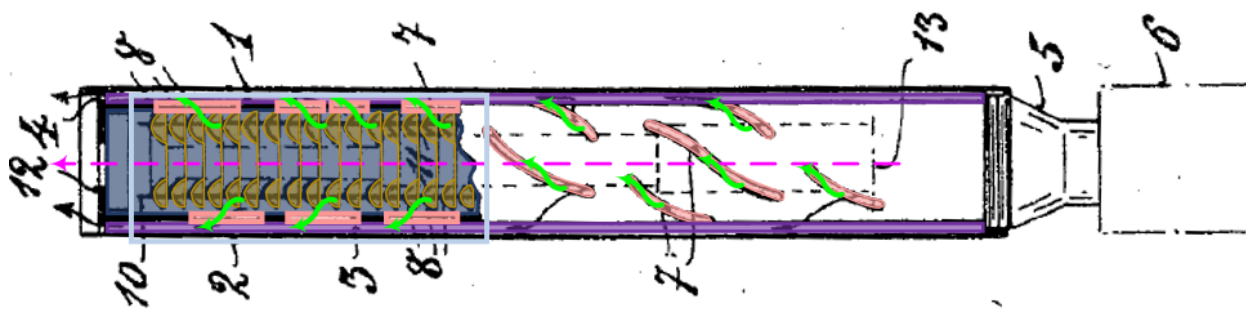
Figure 16 (mapping to Eichenseher's modified ESD)

295. See Section X.A.8.a)(3), *supra*, for a discussion of aspects of this limitation.

296. The perforations running along Eichenseher's inner cylinder 3 disclose the "plurality of orifices." Eichenseher's modified ESD device discloses all the

remaining elements recited in the above limitation. *See* Section X.A.8.a)(3), *supra*.

(4) [19C] “c) a plurality of deflectors oriented in series along the central axis of the central chamber, wherein a position of multiple individual deflectors of the plurality of deflectors corresponds with the individual orifices of the plurality of orifices to the common off axis chamber.”



EX1021 at FIG. 1 (annotated)

297. *See* Section X.A.8.a)(4), *supra*, for a discussion of aspects of this limitation.

298. Eichenseher's silencers 8 that deflect energy to the cavity 3 through the perforations running along the inner cylinder 3 disclose “a position of multiple individual deflectors of the plurality of deflectors corresponds with the individual orifices of the plurality of orifices to the common off axis chamber.”

Eichenseher's modified ESD device discloses all the remaining elements recited in the above limitation. *See* Section X.A.8.a)(4) *supra*.

XI. MATERIALLY DIFFERENCE AND NON-CUMULATIVE NATURE OF THE PRIOR ART REFERENCES

299. During prosecution, the Examiner explicitly applied the following prior art references: U.S. Patent No. 7,987,944 to Brittingham (EX1005), U.S. Patent No.

6,425,310 to Champion (EX1006), U.S. Patent No. 7,207,258 to Scanlon (EX1007), U.S. Patent No. 5,952,625 to Huff (EX1008), U.S. Patent No. 5,029,512 to Latka (EX1009), U.S. Patent No. 6,796,214 to Hausken (EX1010), U.S. Patent No. 5,078,043 to Stephens (EX1011), and U.S. Pat. No. 1,341,363 to Fiala (EX1012). The individual prior art references and combinations in this Declaration are materially different from these prior art references because, in my opinion, they disclose limitations not disclosed by the applied prior art references and because they disclose or render obvious every limitation of the challenged claims.

XII. CONCLUSION

300. I submit this Declaration in support of Petitioner's Petition for *inter partes* Review.

301. This Declaration is based on the information presently available to me as of the date of this Declaration. To the extent any additional information is provided at a later time that could further support or modify the conclusions and opinions I have reached to date, I reserve the right to amend or supplement this Declaration, and/or provide an updated Declaration based upon that information. I further reserve the right to consider and comment/opine on any additional positions taken by patent owner or patent owner's experts and testimony of such provided in this proceeding. In summary, I reserve the right to correct, expand, or otherwise edit

this Declaration should new information be made available, or errors or omissions be discovered.

302. In signing this declaration, I recognize that this declaration will be filed as evidence in this IPR proceeding before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in this IPR proceeding and that cross-examination will take place within the United States. If cross-examination is required, I will appear for cross-examination within the United States during the time allotted.

303. I hereby declare that all statements made herein are made of my own knowledge and are, to the best of my knowledge, true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willfully made false statements are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

304. I reserve the right to correct, amend, expand or otherwise modify this Declaration should errors or omissions be discovered or additional information or documents become available.

Expert Declaration of Mr. Nixon in support of SilencerCo's Petition for IPR of:
U.S. Patent No. 8,286,750

Executed on this 25th day of July 2024.



John Nixon.

A. APPENDIX: CLAIMS LISTING

1. An energy capture and control device, comprising:
 - a) a central chamber oriented along a central axis within an outer shell, said central chamber having an inlet configured to receive a high energy material from a high energy outlet;
 - b) a common off axis chamber oriented within the outer shell in fluid communication with the central chamber and having a fluid outlet and multiple internal walls defining a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine and which dissipates energy transferred from the high energy material; and
 - c) a plurality of deflectors oriented in series along the central axis of the central chamber and configured to deflect the energy from the high energy material to the common off axis chamber.
2. The device of claim 1, wherein the common off axis chamber comprises a plurality of sub-chambers defined by the plurality of deflectors, each with the radially serpentine fluid pathway, and wherein the radially serpentine fluid pathways of each of the deflectors are axially non-linearly interconnected along an outermost portion of the plurality of sub-chambers.
3. The device of claim 1, wherein the central chamber further comprises a locking block oriented at the inlet, said locking block having an engagement surface configured to attach to the high energy outlet and a hollow

interior along the central axis, said hollow interior having a reducing throat portion and a flared outlet.

4. The device of claim 1, wherein the plurality of deflectors each comprise a frustoconical shape having a hollow interior along the central axis and a flared exit portion.

5. The device of claim 4, wherein the plurality of deflectors include a primary deflector, a secondary deflector, and at least one tertiary deflector.

6. The device of claim 5, wherein the fluid communication between the common off axis chamber and the central chamber occurs only at the primary deflector, the secondary deflector and a first tertiary deflector.

7. The device of claim 5, wherein at least one tertiary deflector is at least partially engaged within the flared exit portion of an adjacent deflector.

8. The device of claim 4, wherein the plurality of deflectors span substantially the entire central axis along the central chamber.

9. The device of claim 1, wherein the multiple internal walls are formed to produce a radially serpentine fluid pathway.

10. The device of claim 1, wherein the multiple internal walls are formed by multiple concentric tubes having progressively larger diameters so as to

form annular spaces between each adjacent tube, and having alternating ends offset so as to produce the axially serpentine fluid annular pathway.

11. The device of claim 10, wherein the multiple concentric tubes include an innermost tube which includes orifices oriented to allow fluid to pass from the central chamber into a first annular space adjacent the innermost tube and through the annular spaces of progressively larger diameter.

12. The device of claim 11, wherein the annular spaces further include a helical wall oriented within at least one of the annular spaces to direct fluids along a helical path within the at least one annular space.

13. The device of claim 12, wherein the helical wall has a quadrilateral cross-section or a circular cross-section.

14. The device of claim 12, wherein the helical wall has a winding ratio (windings:diameter) of about 3:1 to about 8:1.

15. The device of claim 1, wherein the common off axis chamber further includes an annular dampening chamber oriented about the central chamber and being filled with an energy absorbent material.

16. The device of claim 15, wherein the dampening chamber is oriented adjacent the outer shell.

17. The device of claim 15, wherein the energy absorbent material is selected from the group consisting of powder tungsten filament, heavy metal powder, graphite, polymer, aluminum, stainless steel, carbon steels, iron, copper,

tantalum, titanium, vanadium, chromium, zirconium, carbides of these, alloys of these, and combinations thereof.

18. The device of claim 1, wherein the outer shell includes an end cap assembly at an outlet end of the central chamber and which allows fluid to escape from the common off axis chamber through the fluid outlet, the fluid outlet being only accessible to the fluid in the common off axis chamber.

19. An energy capture and control device, comprising:

a) a central chamber oriented along a central axis within an outer shell, said central chamber having an inlet configured to receive a high energy material from a high energy outlet;

b) a common off axis chamber oriented within the outer shell in fluid communication with the central chamber via a plurality of orifices and further includes a fluid outlet, the common off axis chamber comprising a serpentine fluid pathway which is at least one of axially serpentine and radially serpentine; and

c) a plurality of deflectors oriented in series along the central axis of the central chamber, wherein a position of multiple individual deflectors of the plurality of deflectors corresponds with the individual orifices of the plurality of orifices to the common off axis chamber.

20. The device of claim 19, wherein the common off axis chamber further comprises at least one helical wall defining the axially serpentine fluid pathway, the at least one helical wall being configured to produce an axially

serpentine fluid pathway which helically spirals around the central chamber and which dissipates energy transferred from the high energy material.

21. The device of claim 19, further comprising multiple internal walls defining the axially serpentine fluid pathway, the multiple internal walls being formed by multiple concentric tubes having progressively larger diameters so as to form annular spaces between each adjacent tube, and having alternating ends offset so as to produce a serpentine fluid annular pathway.

22. A method for energy capture and control from a high energy device, comprising:

a) discharging a high energy material from the high energy device through an energy capture and control device comprising a central chamber oriented along a central axis within an outer shell, said central chamber having an inlet configured to receive a high energy material from a high energy outlet, and a common off axis chamber oriented within the outer shell in fluid communication with the central chamber, the common off axis chamber comprising an axially serpentine fluid pathway and a fluid outlet; and

b) capturing energy within the common off axis chamber via a plurality of orifices from the central chamber using the axially serpentine fluid pathway, the energy being associated with discharge of the high energy material from the high energy discharge device.