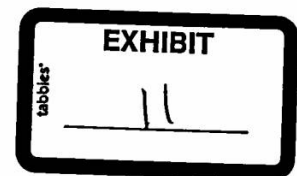




EXHIBIT 4



IN THE UNITED STATES DISTRICT COURT
FOR THE MIDDLE DISTRICT OF NORTH CAROLINA

FUMA INTERNATIONAL LLC, an
Ohio limited liability company,

Plaintiff/Counterdefendant,

v.

R.J. REYNOLDS VAPOR COMPANY,
a North Carolina corporation,

Defendant/Counterplaintiff.

Civ. No. 1:19-cv-00260,
consolidated with
Civ. No. 1:19-cv-00660

DECLARATION OF ATIF YARDIMICI

I, Atif Yardimci, hereby declare:

1. I am a Senior Manager at Exponent Inc. I am an Illinois resident and have a business address at Exponent, Inc., 4580 Weaver Parkway, Suite 100, Warrenville, Illinois 60555. I have personal knowledge of the matters set forth herein and, if called upon to testify, I have the ability and am willing to testify competently as to these matters.

2. In August 2019, Exponent was retained by R.J. Reynolds Vapor Company ("Reynolds") and its legal counsel Haynes and Boone, LLP to provide engineering and scientific consulting services in connection with the above-captioned litigation matter.

3. I was responsible for identifying and implementing the services to be performed, as well as reviewing the results of the services and reporting those results to Reynolds's counsel. I performed some of the services personally, while supervising some services performed by others at Exponent.

4. On August 22, 2019, I received at my Warrenville, IL office from Reynolds's counsel three cartridges and two Fifty-One Duo boxes. These cartridges and boxes are depicted in RJRV-F00062102-19 and RJRV-F694624-33. The cartridges I received are referred to as Cartridge 1 (16 mg), Cartridge 2 (8 mg), and Cartridge 3 (4 mg) in RJRV-F00062102-19 and RJRV-F694624-33 attached hereto at Tab 1.

5. On August 22, 2019, I also received a power unit from Reynolds's counsel. The power unit and Cartridge 2 are depicted in Exhibits I and J to Reynolds's Preliminary Invalidity Contentions attached hereto at Tab 2.

6. I recorded my receipt of Cartridge 1, Cartridge 2, and Cartridge 3 and the boxes, according to Exponent's inventory tracking procedures. On the same day, I shipped the cartridges and boxes to Exponent's Menlo Park, CA office at 149 Commonwealth Drive, Menlo Park, California 94025, where they were received on August 24, 2019. The cartridges were recorded in the Menlo Park, CA office according to Exponent's inventory tracking procedures.

7. At my direction, Dr. Felicia Svedlund and Dr. Nikita Pak performed and/or supervised the performance of industrial scanning using the X50 3D Computed Tomography X-ray inspection system and reconstructed computer tomography generated images from the scans of the cartridges. The results of those activities were recorded as electronic data.

8. After the scanning and reconstructive imaging was completed, the resulting data and cartridges were transferred to me in Warrenville, IL. The receipt of the cartridges was recorded pursuant to Exponent's inventory tracking procedures. I reviewed and have used the resulting data to generate visualization images using software supplied by the scanner manufacturer (Software: efX-ct Lite, Manufacturer: North Start Imaging) in Warrenville, Illinois; along with the documents for Reynolds's counsel.

9. I also personally photographed Cartridge 1, Cartridge 2, and Cartridge 3, the Fifty-One Duo boxes, and the power unit.

10. Following the non-destructive scanning and imaging activities outlined above, I conducted a physical tear down of Cartridge 2 in Warrenville, IL. As part of that physical tear down process, I photographed the internal and external structure of Cartridge 2.

11. The photographs, scans, reconstructive imaging and visualization images contained in RJRV-F00062102-19 and RJRV-F694624-33 are true and

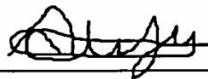
accurate copies of the photographs, scans, reconstructive imaging and visualization images generated by Exponent Inc. as outlined above.

12. The photographs, scans, reconstructive imaging and visualization images contained in Exhibits I and J to Reynolds's Preliminary Invalidity Contentions are true and accurate copies of the photographs, scans, reconstructive imaging and visualization images generated by Exponent Inc. as outlined above.

13. Additional visualization images of Cartridges 2 and 3 attached hereto at Tab 3 are true and accurate copies of the scans, reconstructive imaging and visualization images generated by Exponent Inc. as outlined above.

I declare under penalty of perjury under the laws of the United States of America that each of the foregoing statements is true and accurate.

Executed on January 21, 2020



Signature

4580 Weaver Parkway, Suite 100

Warrenville, IL, 60555

Address/Contact Information

Tab 1



CT Analysis of Cartridges:

September 16, 2019

1906956.EXD - 8737

[Handwritten signature]
2019.9.19



Outline

- Objective
- Cartridge 1
- Cartridge 2
- Cartridge 3

RJR/V-F000062103

1906956 EX0 - 8737



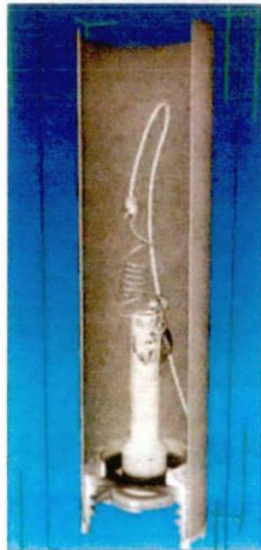
Objective

Assess the internal structure of the cartridges provided.

1906956.EXD - 8737

RJR/V-F00062104

Cartridge 1 : No Box, Yellow, 16mg

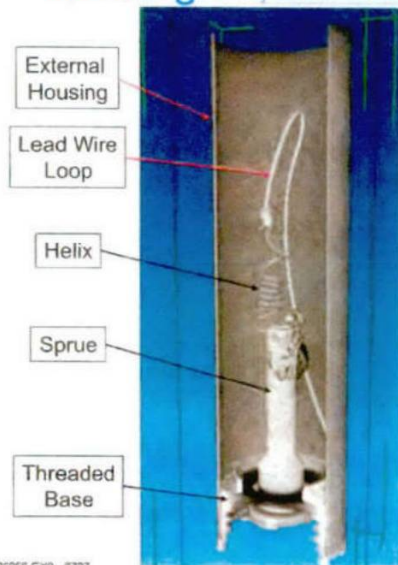


1906956.EX0 - 8737



RJR-V-F000062105

Cartridge 1, No Box, Yellow, 16mg



1906956 EXD - 8737

There are central openings/apertures at opposing ends of the cartridge.

Threaded connector/electrode allows docking to the power pack.

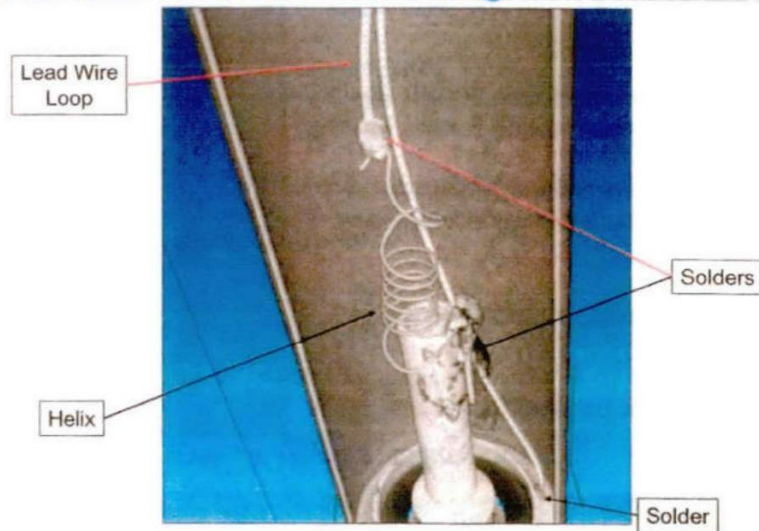
Central metallic sprue rises mid-level in the cartridge and provides anchoring/soldering point for the lead wire loop.

The heating helix is thinner wire compared to the lead wires. The heating helix is connected to the thicker gage wires via solders.

The other end of the lead wire loop is soldered to the threaded connector/base.

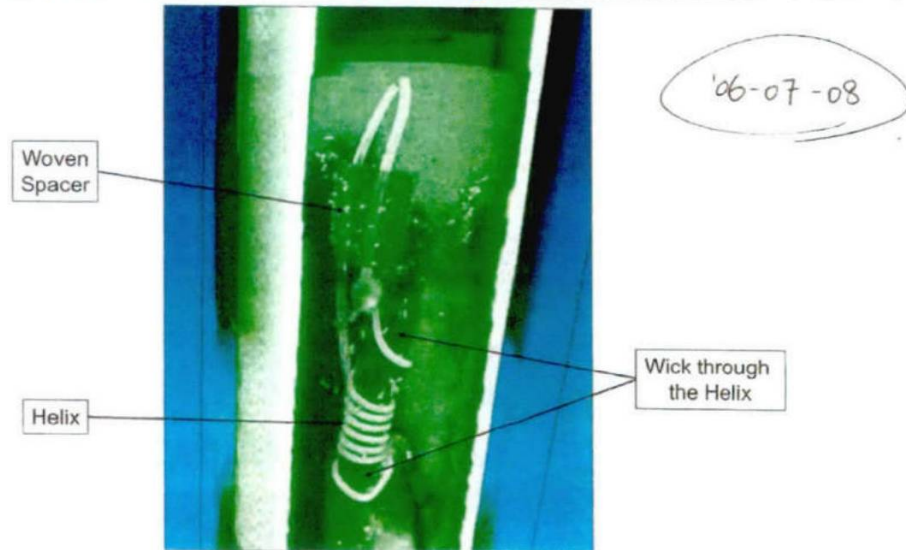
An insulator separating the sprue from the threaded base is expected.

Cartridge 1, No Box, Yellow, 16mg



1906956.EXD - 8737
RJR/V-F000062107

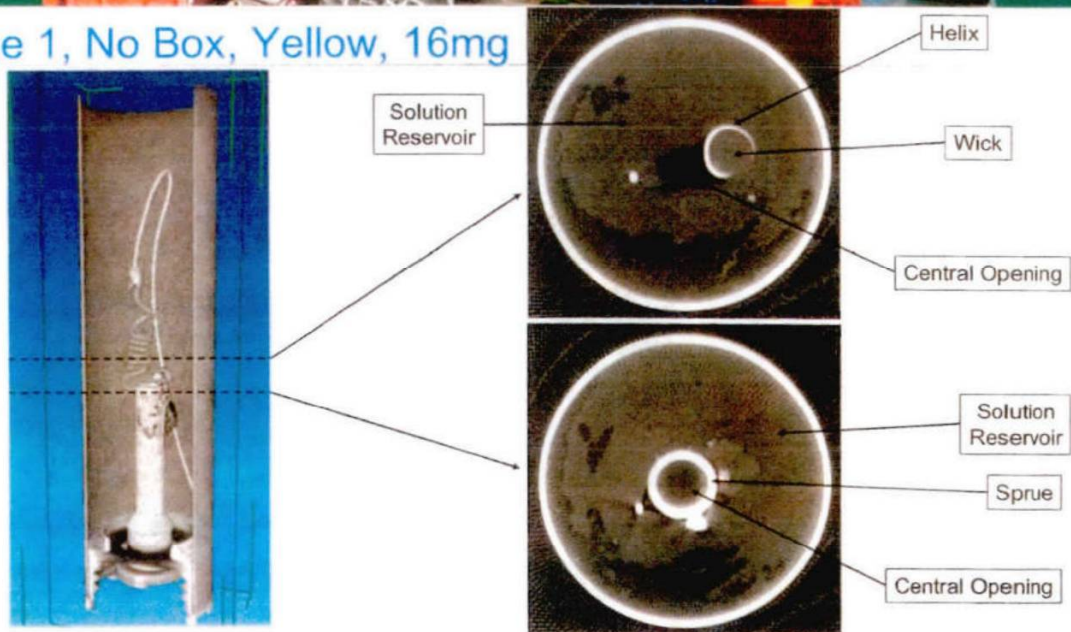
Cartridge 1, No Box, Yellow, 16mg



1906956 EXD - 8737

RJRV-F00062108

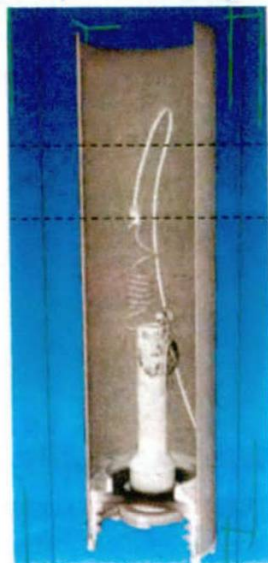
Cartridge 1, No Box, Yellow, 16mg



1906956 EXD - 8737

RJR/F000062109

Cartridge 1, No Box, Yellow, 16mg

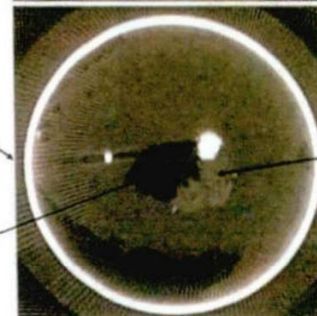


Woven
Spacer



Central Opening

Wick



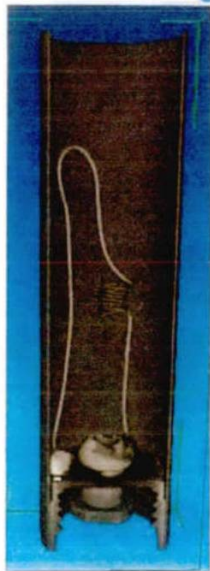
Wick

Central
Opening

1908955 EX0 - 8737

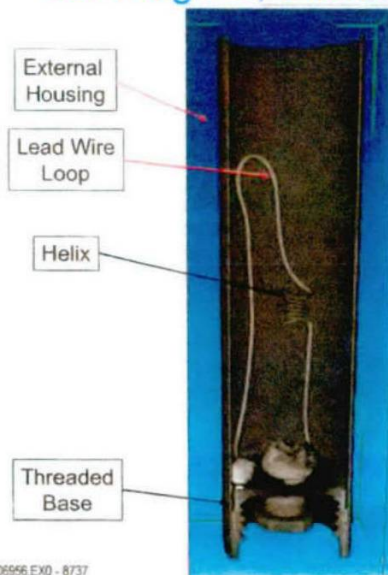
RJR/V-F000062110

Cartridge 2, Boxed, Green, 8mg



RJR/F-00006211

Cartridge 2, Boxed, Green, 8mg



There are central openings/apertures at opposing ends of the cartridge.

Threaded connector/electrode allows docking to the power pack.

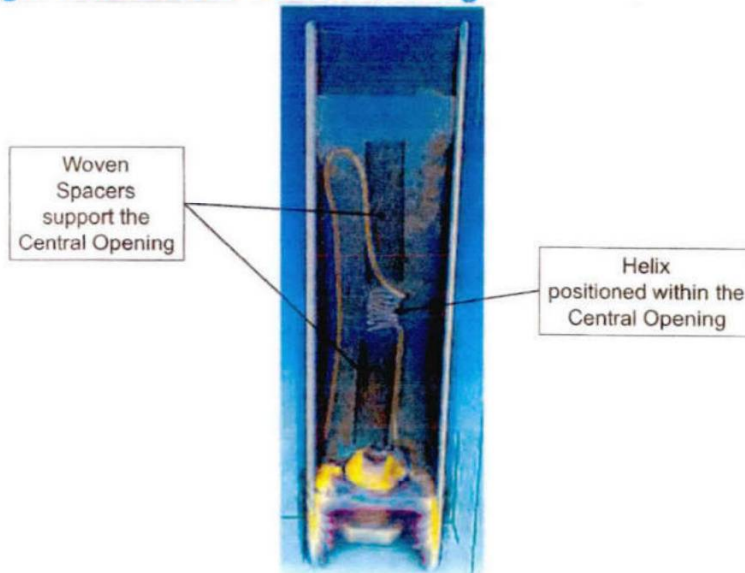
One end of the lead wire loop is soldered to the sprue.

The heating helix and lead wire loop are made from the same wire, no reason for solder transitions.

The other end of the lead wire loop is soldered to the threaded connector/base.

An insulator separating the sprue from the threaded base is expected.

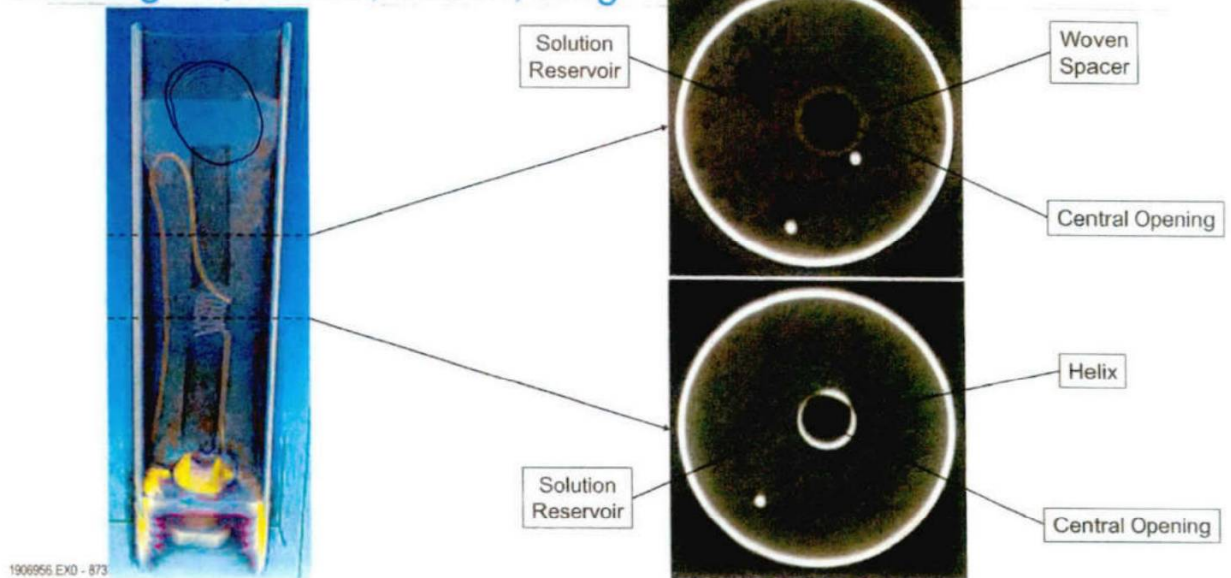
Cartridge 2, Boxed, Green, 8mg



RJR/V-F000062113

1906956.EX0 - 8737

Cartridge 2, Boxed, Green, 8mg



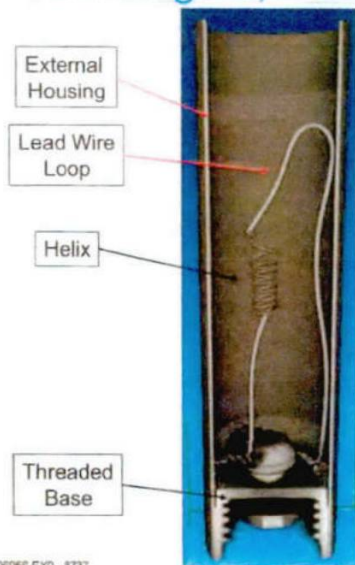
RJRV-F000062114

Cartridge 3, Boxed, Yellow, 4mg



RJR/F-000062115

Cartridge 3, Boxed, Yellow, 4mg



1906956 EXD - 8737

There are central openings/apertures at opposing ends of the cartridge.

Threaded connector/electrode allows docking to the power pack.

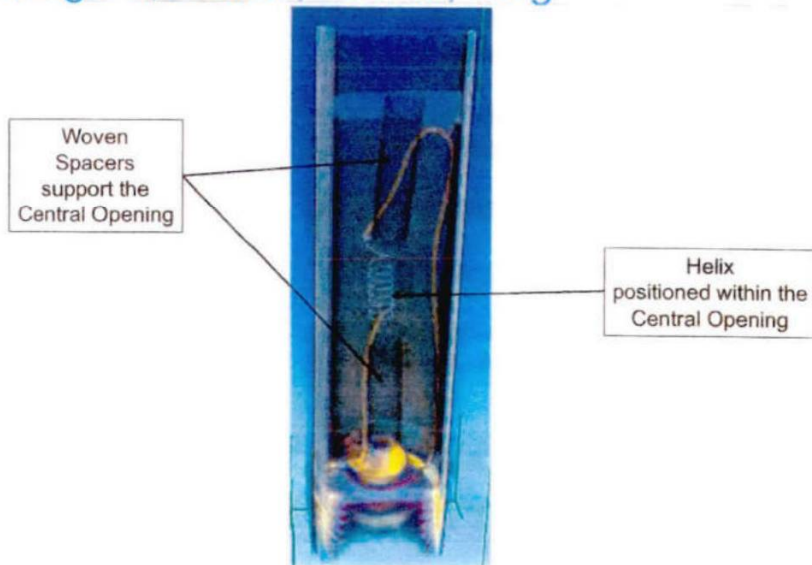
One end of the lead wire loop is soldered to the sprue.

The heating helix and lead wire loop are made from separate wires, with soldering connections.

The other end of the lead wire loop is soldered to the threaded connector/base.

An insulator separating the sprue from the threaded base is expected.

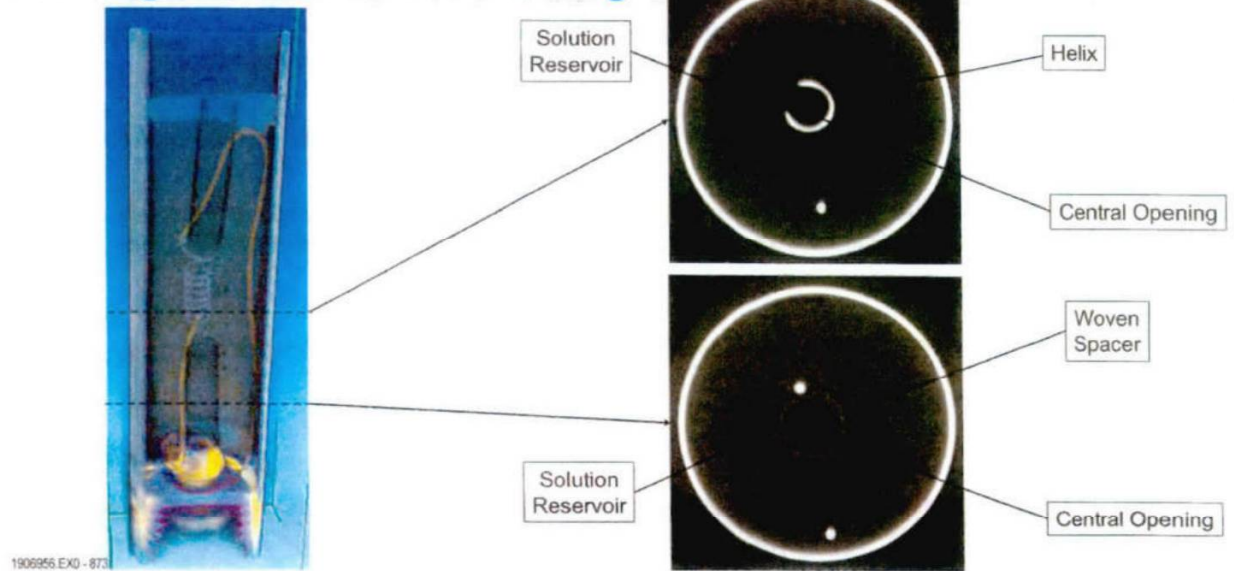
Cartridge 3, Boxed, Yellow, 4mg



RJR-V-F000062117

1906956 EXD - 8737

Cartridge 3, Boxed, Yellow, 4mg



RJR/V-F000062118



Discussion

- In all of the three cartridges, there is a central air passageway surrounded by absorbent material.
- In all of the three cartridges, there are central openings at opposing ends of the product. The central air passageway allows air to travel from first aperture to the second aperture.
- In all of the three cartridges, the heating helix is positioned in the central air passageway.
- In all of the three cartridges, there is a threaded and electrically conductive connector/electrode that allows electrical current to be delivered to the lead wire loop and allows mechanical attachment to the power-pack.



Additional Analysis of Cartridges 1-3: Cap Removed

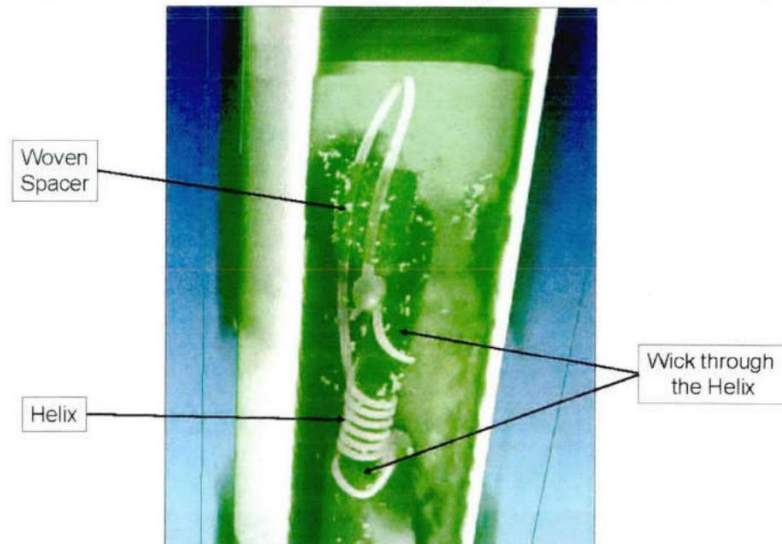
December 16, 2019

190066 EXD - 9182

Case 1:19-cv-00260-CCE-JEP Document 84-4 Filed 01/21/20 Page 25 of 125

RJRV-F000694624

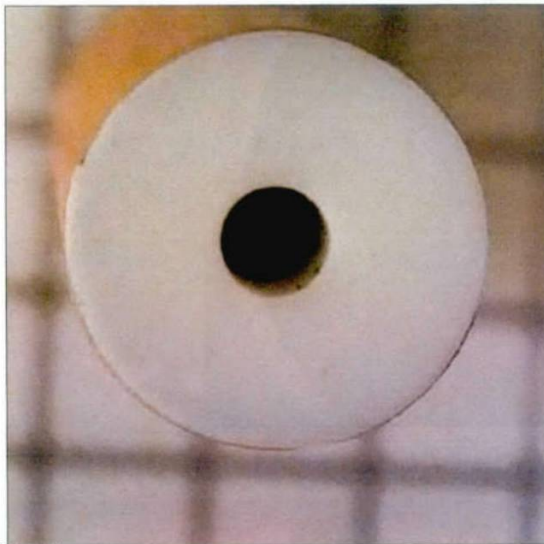
Cartridge 1, No Box, Yellow, 16mg



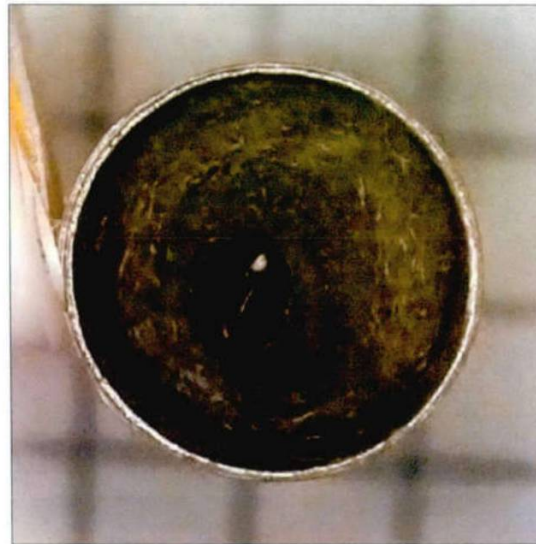
1908066 EXD - 9182

RJRV-F000694625

Cartridge 1, No Box, Yellow, 16mg

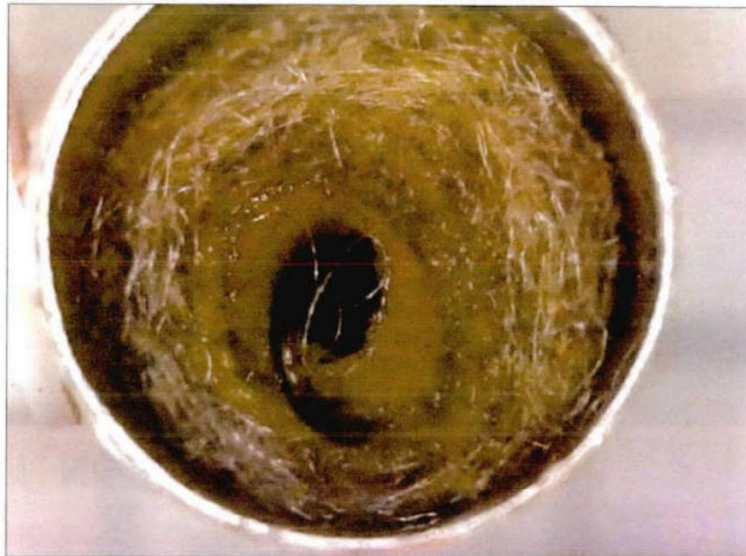


1900866 EX-9182



RJRV-F000694626

Cartridge 1, No Box, Yellow, 16mg

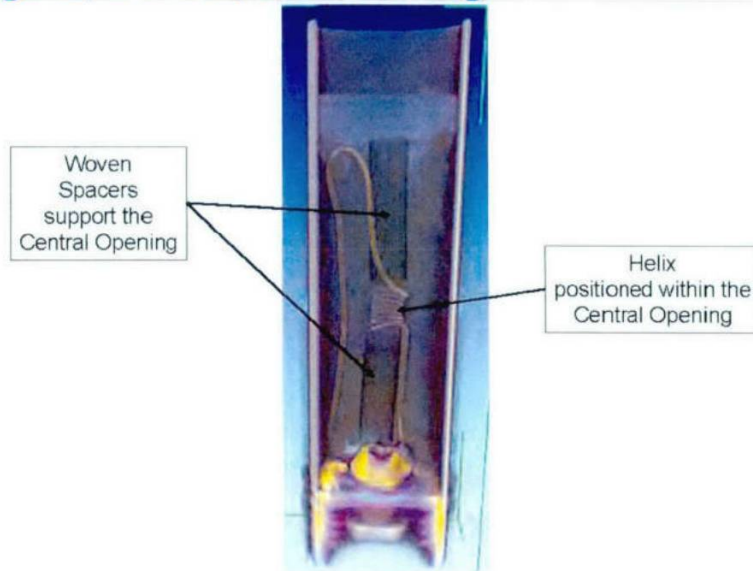


1906066 EXD - 9182

RJRV-F000694627

Case 1:19-cv-00260-CCE-JEP Document 84-4 Filed 01/21/20 Page 28 of 125

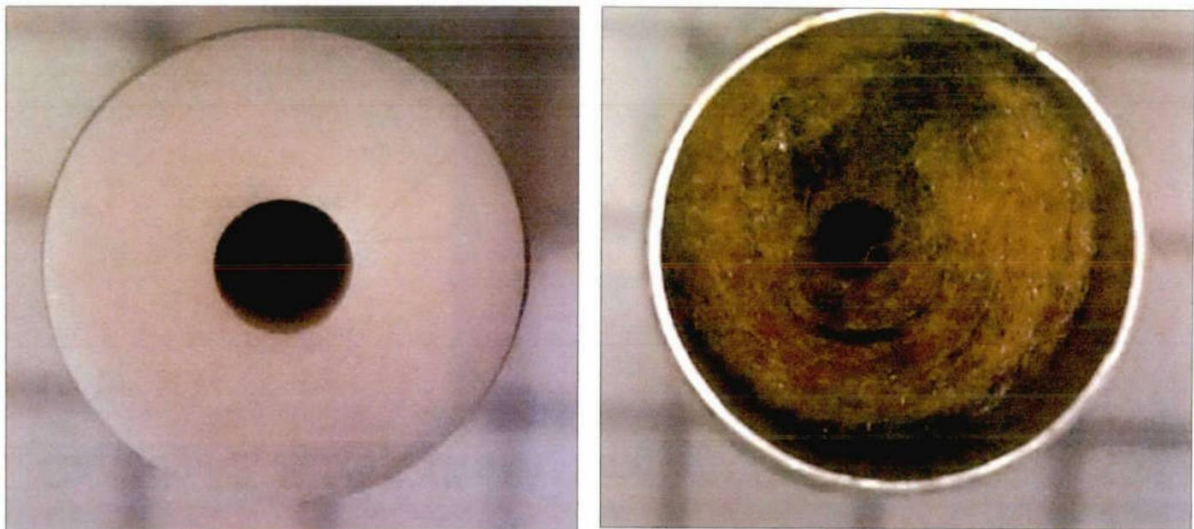
Cartridge 2, Boxed, Green, 8mg



1906956 EX0 - 9182

RJRV-F000694628

Cartridge 2, Boxed, Green, 8mg



1906266 EXD - 9182

FJR/V-F000094629



Cartridge 2, Boxed, Green, 8mg

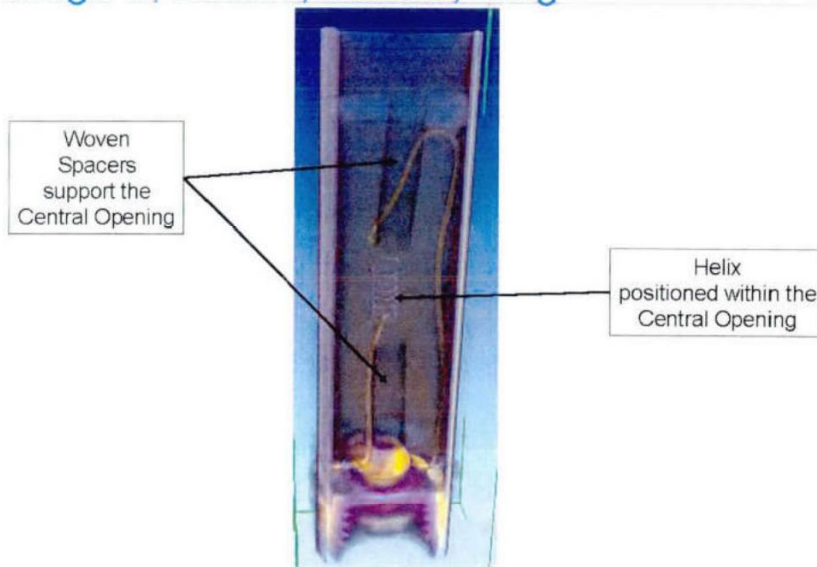


190866 EXO - 9182

RJRV-F000694530

Case 1:19-cv-00260-CCE-JEP Document 84-4 Filed 01/21/20 Page 31 of 125

Cartridge 3, Boxed, Yellow, 4mg

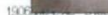


1906966 EXD - 9182

RJRV-F000694631

Case 1:19-cv-00260-CCE-JEP Document 84-4 Filed 01/21/20 Page 32 of 125

Cartridge 3, Boxed, Yellow, 4mg





Cartridge 3, Boxed, Yellow, 4mg



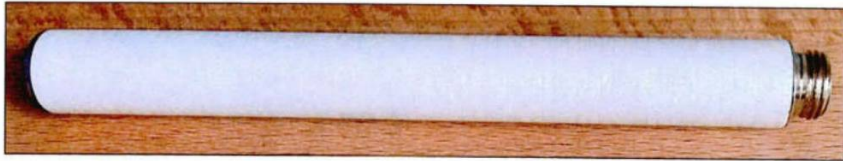
1906066 EXO - 9182

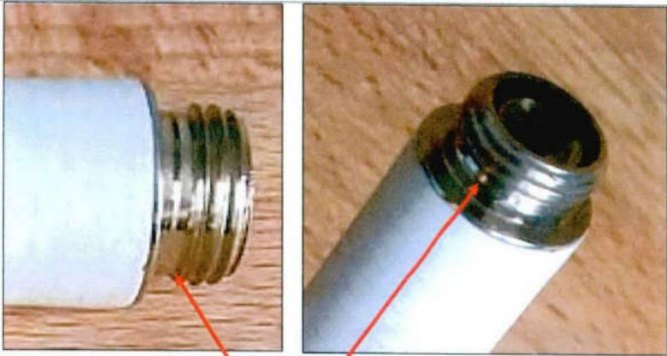
RJRV-F000694633

Case 1:19-cv-00260-CCE-JEP Document 84-4 Filed 01/21/20 Page 34 of 125

Tab 2

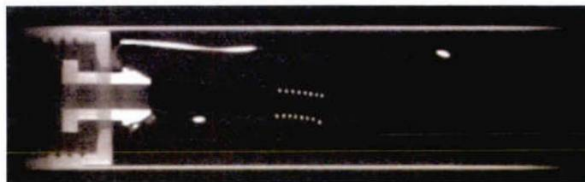
EXHIBIT 1

U.S. PATENT NO. 9,532,604	
CLAIM 1	Fifty-One Two Piece Electronic Cigarette (Manufactured S. Wang for Smoke Anywhere USA, Inc. in 2008 and 2009; Wang Declaration)
An apparatus comprising:	
a power source,	A power source (PS) 
wherein the power source includes a battery,	See Wang Declaration, paragraph 12.
wherein the power source includes an electrically conductive	PS includes an electrically conductive threaded portion at one end

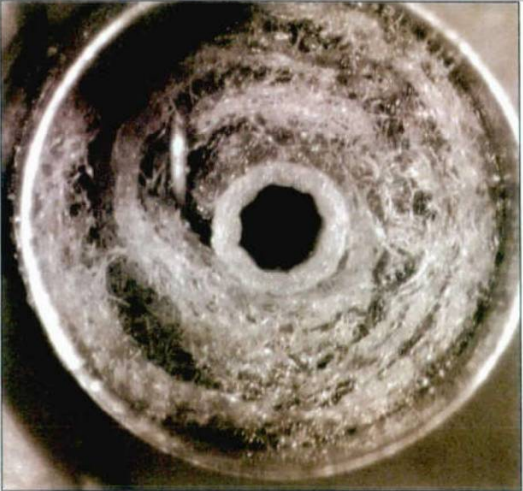
threaded portion; and	 Electrically Conductive Threaded Portion
a cartridge having a housing that comprises an interior,	Cartridge has a housing with an interior.  Once label is removed, the metallic tube that forms the housing is viewable

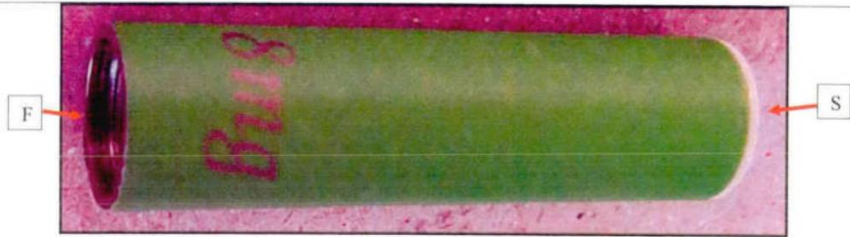
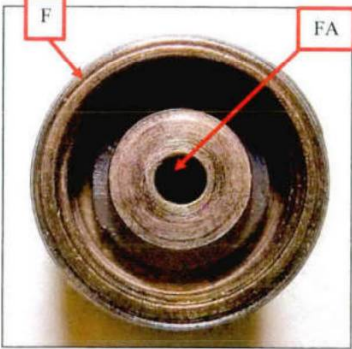


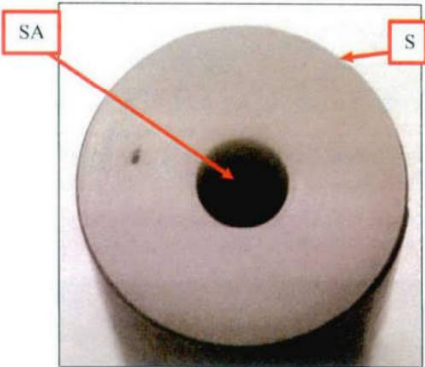
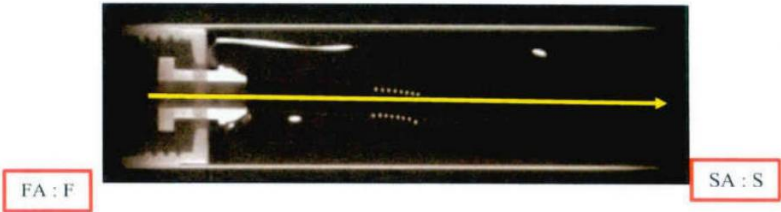
The micro-CT of the cartridge reveals the interior of the housing

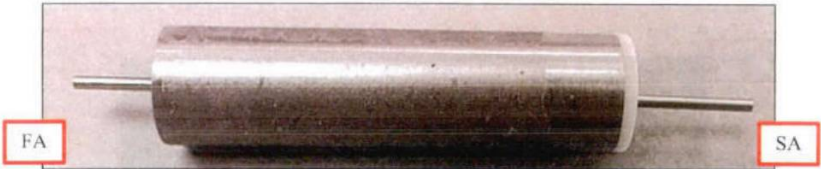
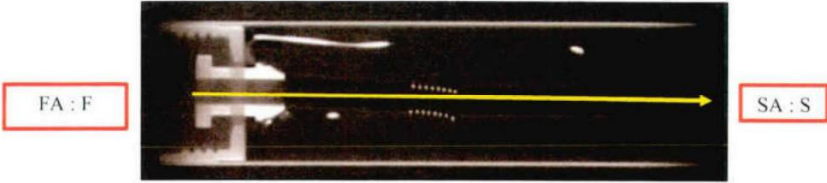
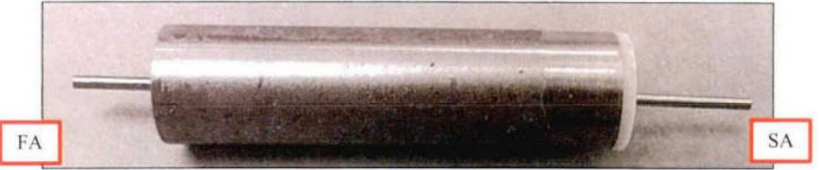


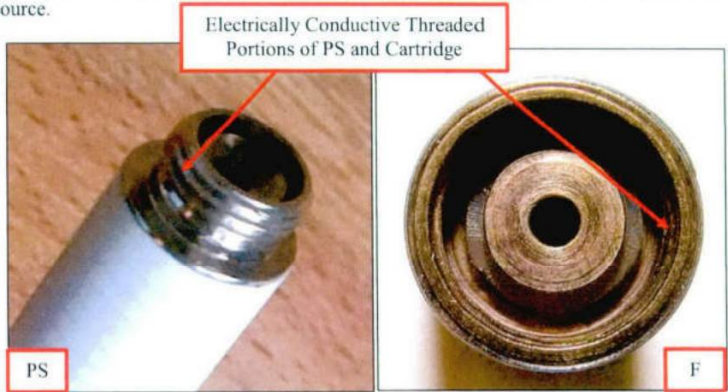
Once the second end is removed the interior is revealed inside the housing

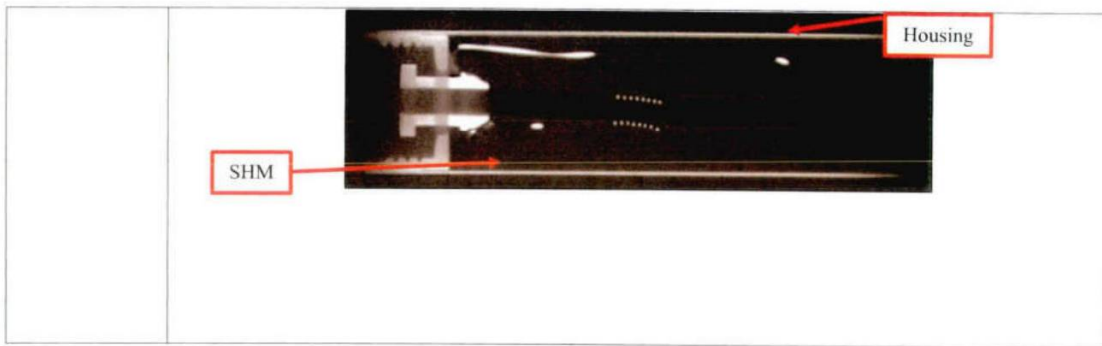
		
wherein the housing includes a first end and a second end that is opposite the first end,	Housing with first (F) and second (S) end, where S is opposite to F.	

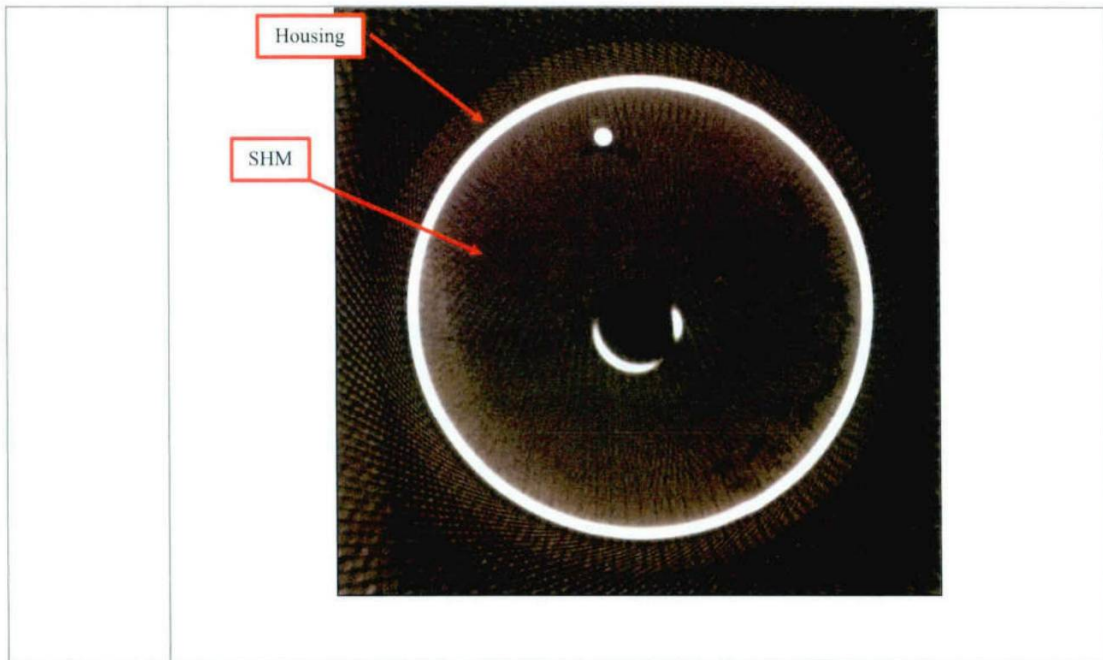
	
wherein the housing includes a first aperture on the first end and a second aperture on the second end,	The housing includes a first aperture, FA on F, and 

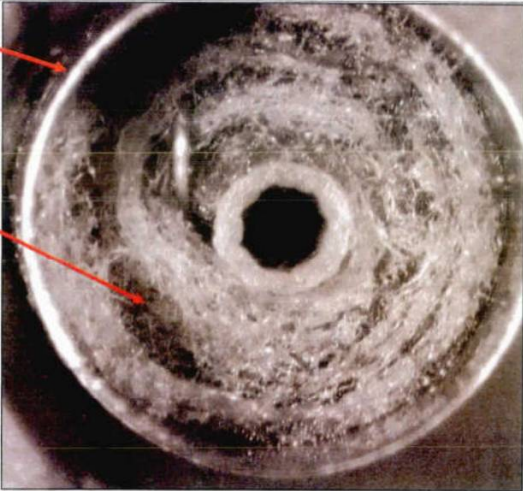
	a second aperture, SA, on S 
wherein the housing includes an airflow passageway that extends centrally and axially with respect to the housing intermediate of the first aperture on the first end of the housing and the second aperture on the	The housing includes an airflow passageway that extends centrally and axially through the housing intermediate of FA on F and SA on S. 

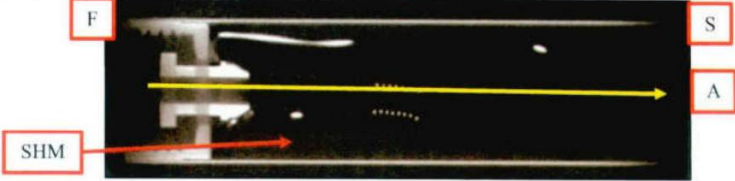
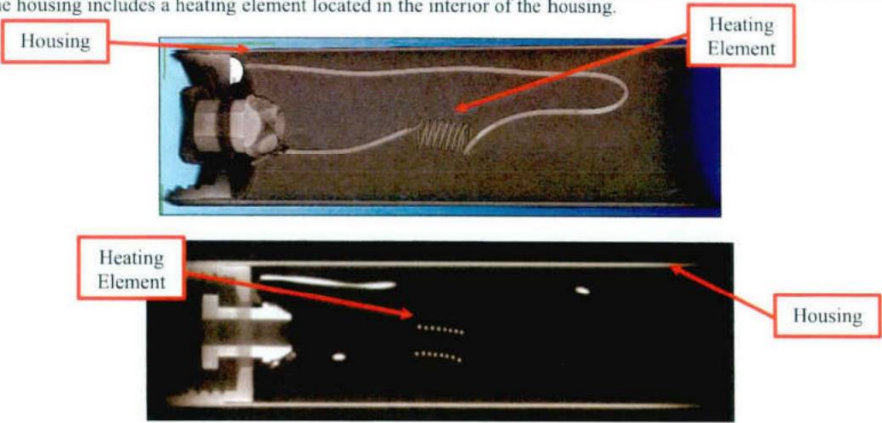
second end of the housing,	A 0.040" gage pin was passed through the FA to SA, further indicating the presence of a central/axial airflow passageway. 
wherein the airflow passageway is configured to allow art [sic] airflow through the cartridge from the first aperture to the second aperture of the housing,	The airflow passageway is configured to allow airflow through the cartridge from FA on F to SA on S  A 0.040" gage pin was passed through the FA to SA, further indicating the presence of a central/axial airflow passageway configured to allow airflow through the cartridge from FA to SA. 

Wherein the first end of the housing includes an electrically conductive threaded portion that is adapted to mechanically and electrically couple to the electrically conductive threaded portion of the power source,	F of the housing includes an electrically conductive threaded portion that is adapted to mechanically and electrically couple to the electrically conductive threaded portion of the PS PS and F include threaded electrically conductive connectors (confirmed with a calibrated multimeter [Fluke 87 Multimeter, ID 94050236, Cal. Exp. 12/13/19] that the connectors have low resistivity [$<1\Omega$]) that has threads. These electrically conductive threaded portions couple the cartridge mechanically and electrically to the power source. 
wherein the housing includes a solution holding medium comprising a solution located in the interior of the housing,	The housing includes a solution holding medium (SHM) comprising a solution in the interior of the housing



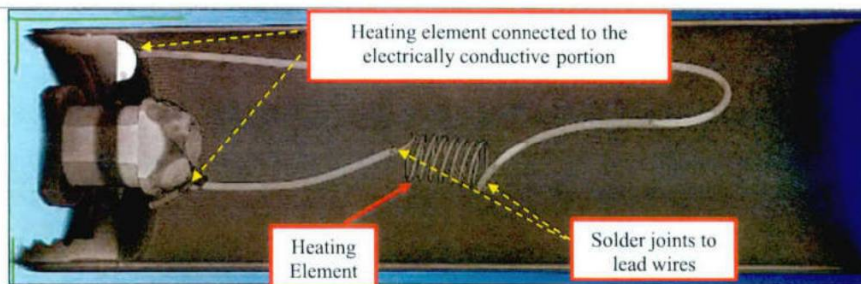


	
wherein the solution holding medium surrounds the airflow passageway in the interior of the housing and intermediate of	The SHM surrounds the airflow passageway in the interior of the housing and intermediate of F and S

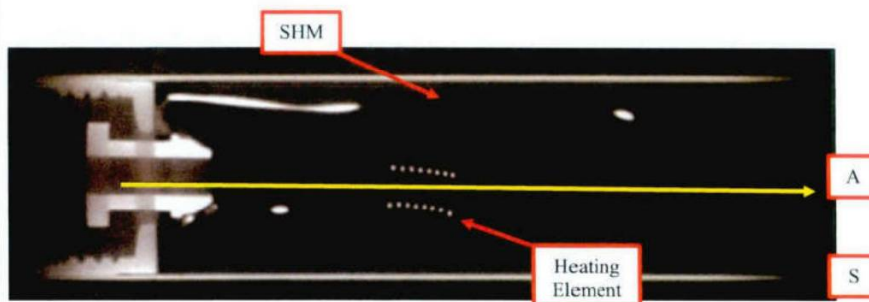
the first end and the second end,	
wherein the housing includes a heating element located in the interior of the housing,	The housing includes a heating element located in the interior of the housing. 

	The wall of the housing opened to expose heating element in the interior of the housing.
wherein the heating element is electrically configured to vaporize at least a portion of the solution for oral provision to an individual in the airflow from the second aperture responsive to electrical power received from the battery	The heating element is electrically configured to vaporize at least a portion of the solution for oral provision to an individual in the airflow from the second aperture responsive to electrical power received from the battery through the electrically conductive threaded portions of the cartridge and power source.

through the electrically conductive threaded portions of the cartridge and power source.



Solution vaporized by the heating element is orally provided to an individual through airflow (A) from SA.



CLAIM 2

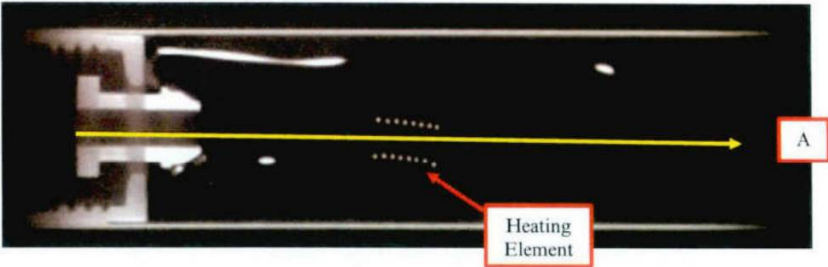
The apparatus according to claim 1, wherein

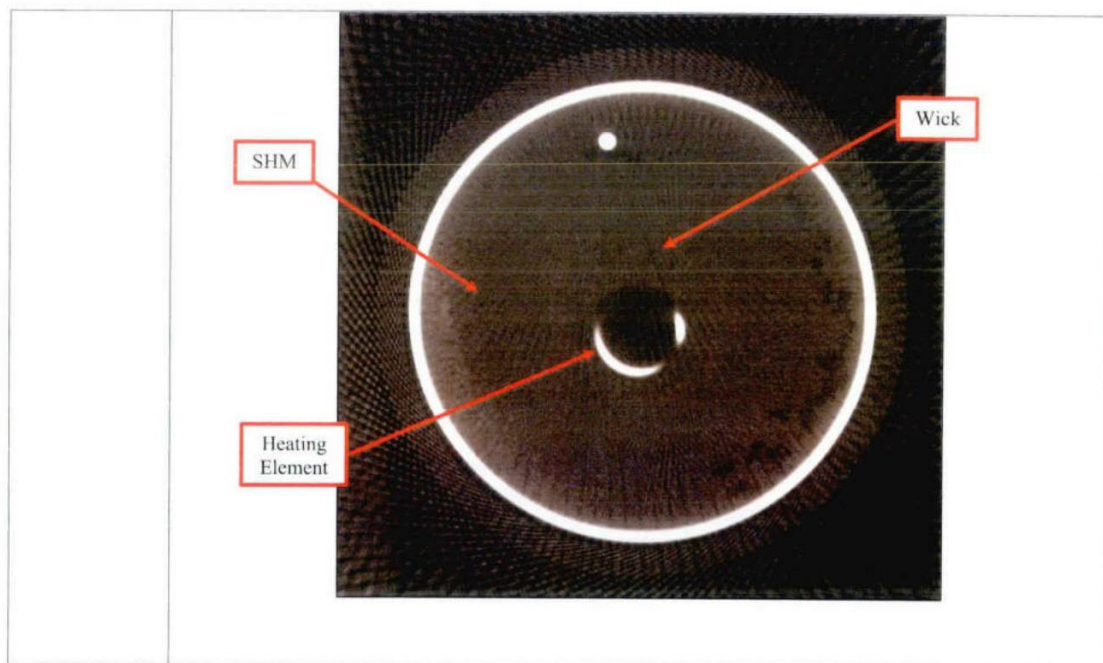
SHM includes an absorbent material

the solution holding medium includes at least one of an absorbent material, a chamber, a reservoir, a capsule, or any combination thereof.

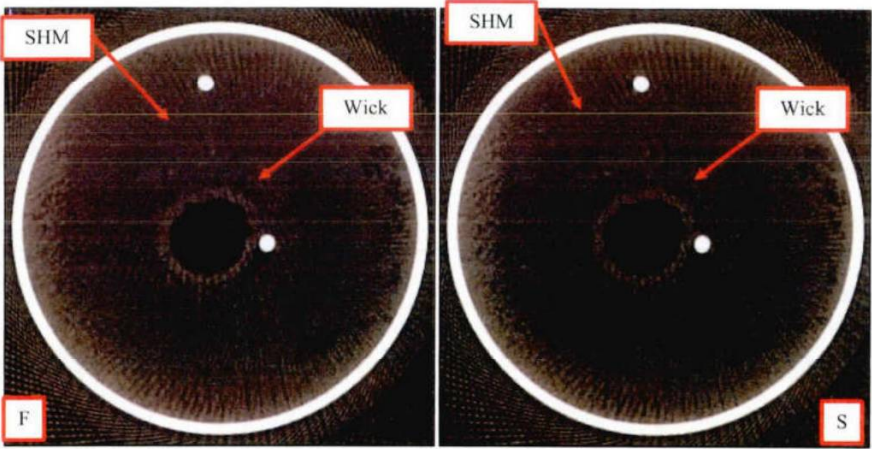


The wall of the housing is opened to expose and remove the absorbent material/SHM from housing

CLAIM 4	
The apparatus according to claim 1, wherein the heating element extends transversely across the airflow passageway, whereby airflow through the passageway passes on both transverse sides of the element.	The heating element extends across the airflow passageway whereby airflow through the passageway passes through the heating element. 
CLAIM 6	
The apparatus according to claim 2, wherein the heating element comprises a wicking material to attract the solution from the solution holding medium to the heating element.	The heating element comprises a wicking material to attract solution from the SHM to the heating element.

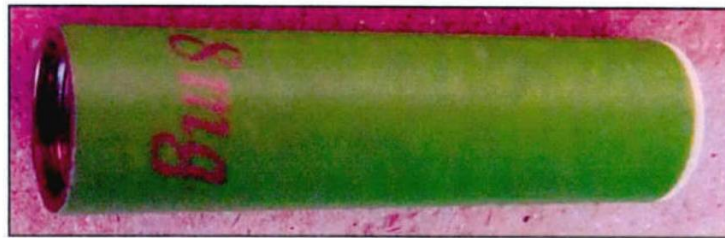




	
CLAIM 12	
An apparatus comprising:	

electronic cigarette cartridge, wherein the electronic cigarette cartridge includes a housing,

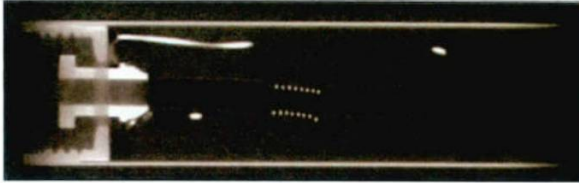
Cartridge includes a housing.



Once label is removed, the metallic tube that forms the housing is revealed.



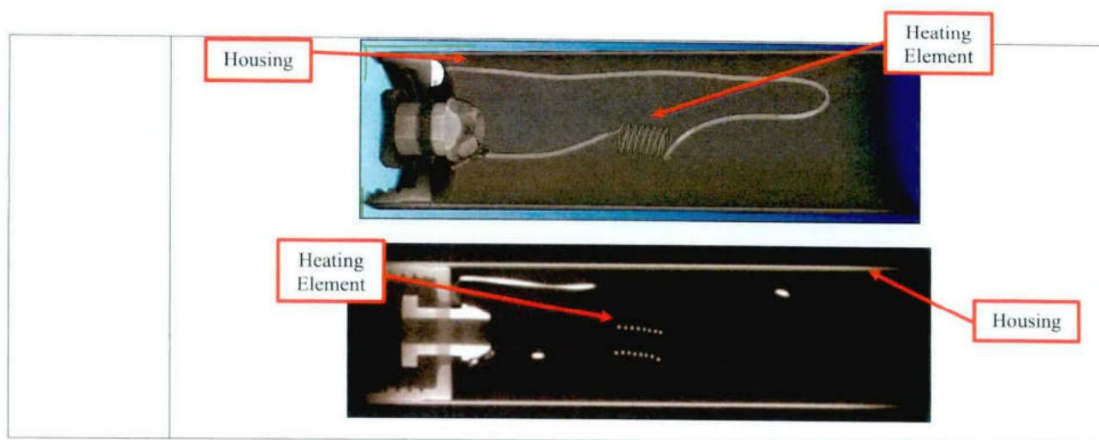
		
wherein the housing is constructed of a non-metallic material,		
wherein the housing includes: an interior;	The housing includes an interior. The micro-CT of the cartridge reveals the interior of the housing,	

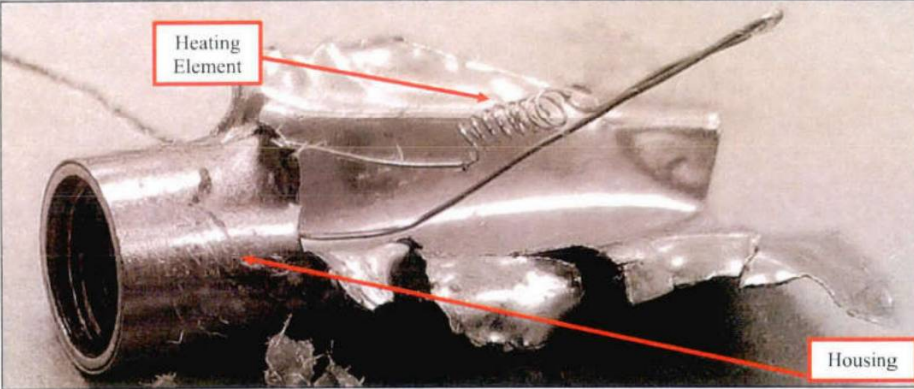
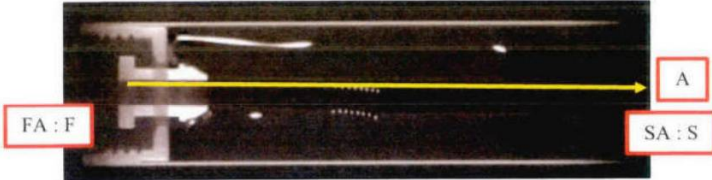


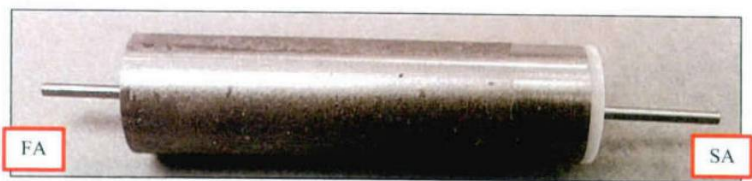
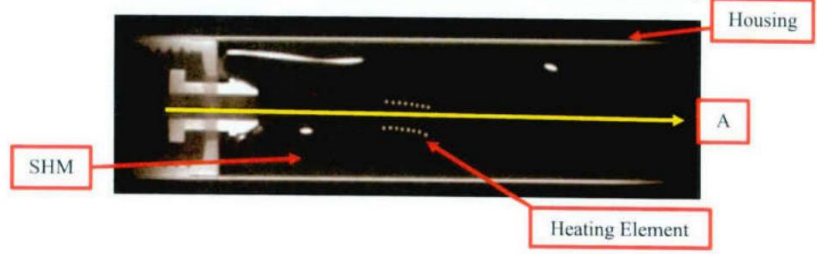
Once the second end is removed the interior is revealed inside the housing



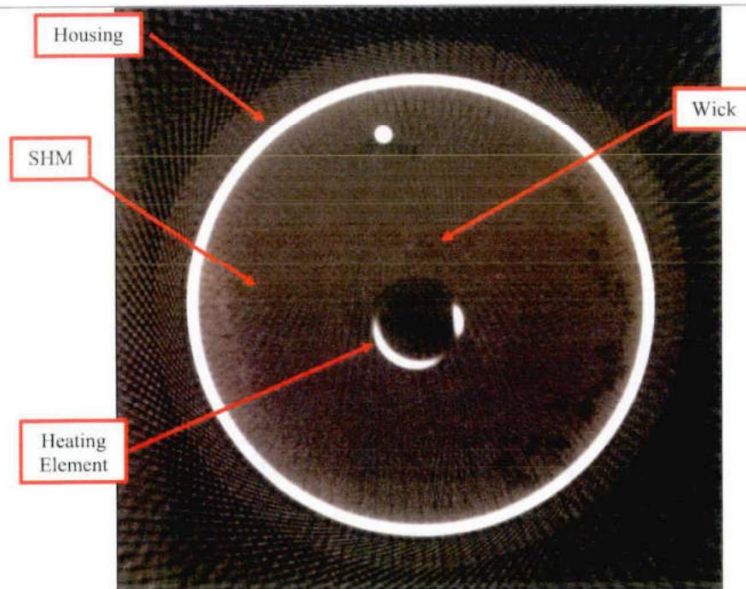
a first end;	Housing with first (F) and second (S) end, where S is opposite to F. 
a second end that is opposite the first end;	Housing with first (F) and second (S) end, where S is opposite to F. 
a heating element located in the interior of the housing;	The housing includes a heating element located in the interior of the housing



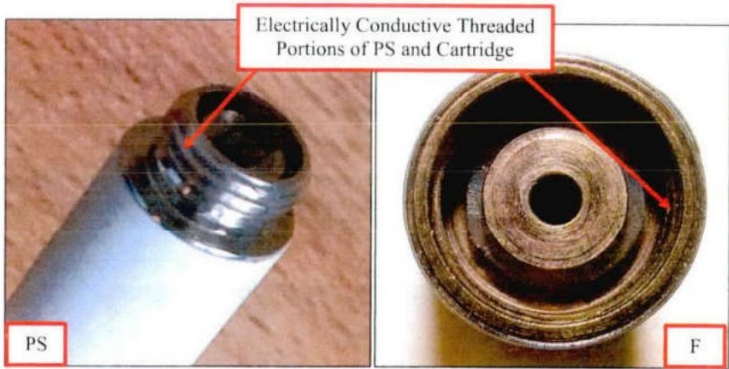
	 The wall of the housing is opened to expose the heating element located in the interior of the housing.
an airflow passageway that extends intermediate of the first end and the second end axially through the interior of the housing along a central longitudinal axis of the housing,	The airflow passageway extends intermediate of F and S axially through the interior of the housing along a central longitudinal axis of the housing, wherein the airflow passageway enables airflow from F to S 

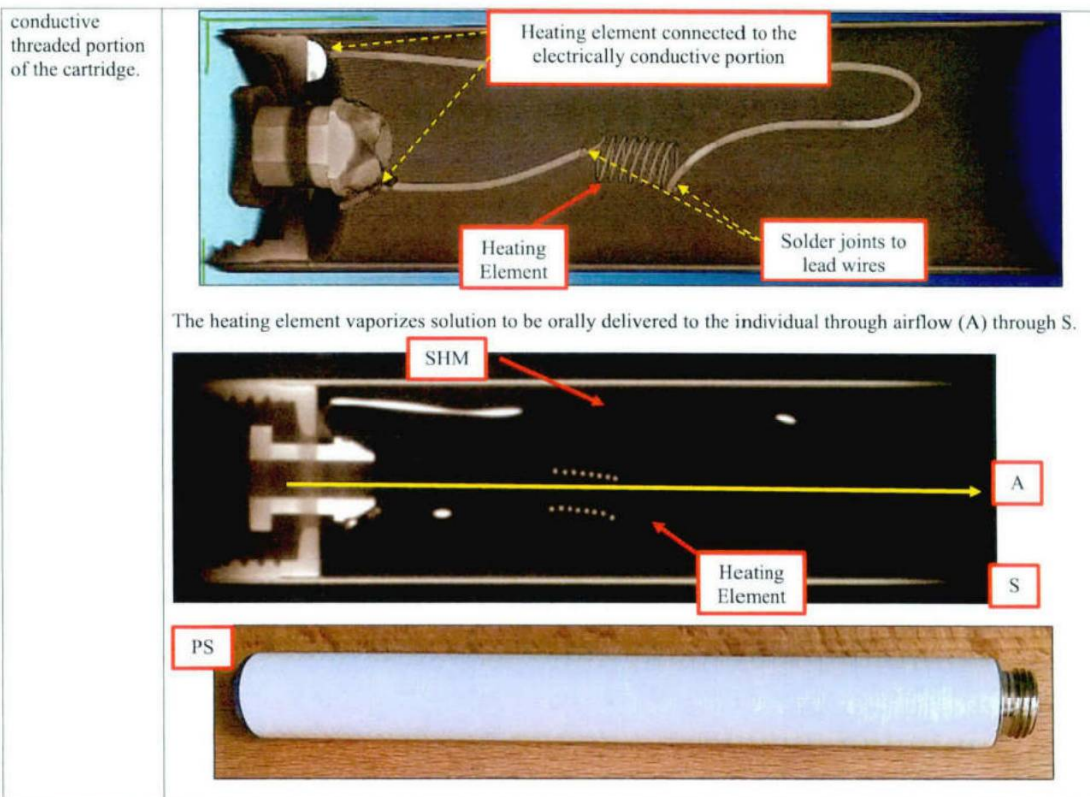
wherein the airflow passageway enables airflow from the first end to the second end;	A 0.040" gage pin was passed through the FA to SA, further indicating the presence of a central/axial airflow passageway. 
a solution holding medium located in the interior of the housing, wherein the medium extends in surrounding relation of the heating element and the airflow passageway, wherein the medium includes a liquid solution, wherein the medium includes at least one of an absorbent material, a chamber, a reservoir, a	SHM is located in the interior of the housing, wherein the SHM extends in surrounding relation of the heating element and the airflow passageway. The SHM is an absorbent material and includes a liquid solution. 

capsule, or any combination thereof,

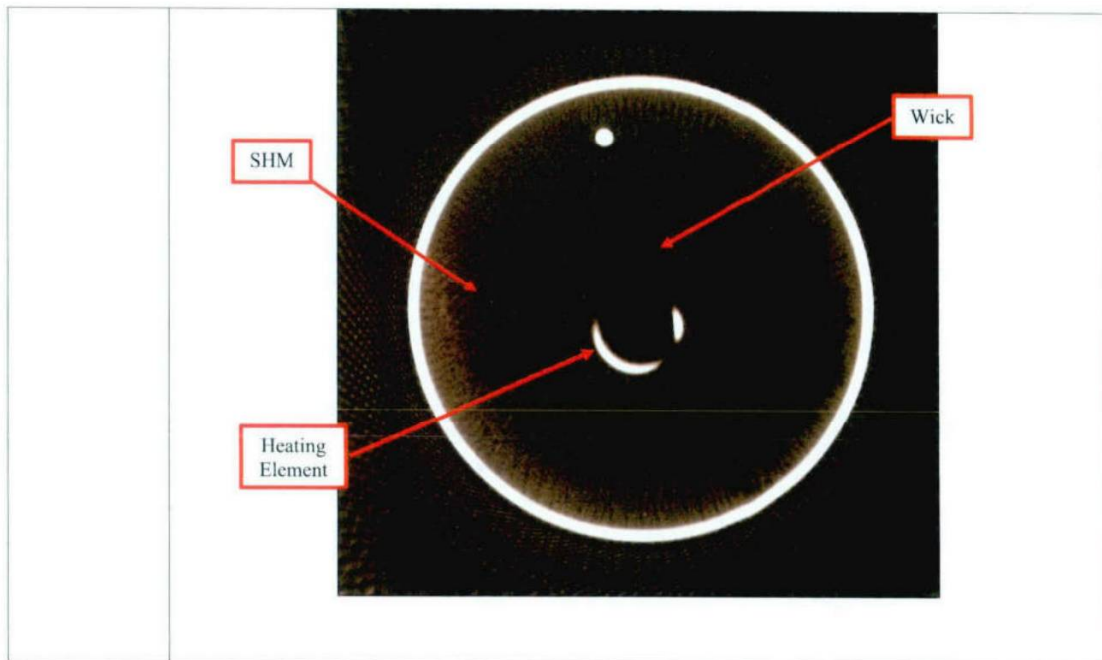


	Housing SHM is an absorbent material and includes a liquid solution
wherein the first end of the housing includes an electrically conductive threaded portion that is configured to mechanically and electrically	F of the housing includes an electrically conductive threaded portion that is configured to mechanically and electrically couple to a further electrically conductive threaded portion in operative connection with a power source. PS and F include threaded electrically conductive connectors (confirmed with a calibrated multimeter [Fluxe 87 Multimeter, ID 94050236, Cal. Exp. 12/13/19] that the connectors has low resistivity [$<1\Omega$]) that have threads. These electrically conductive threaded portions couple the cartridge mechanically and electrically to the power source.

couple to a further electrically conductive threaded portion in operative connection with a power source,	
wherein the heating element is configured to vaporize at least a portion of the solution for oral delivery from the second end of the housing upon receiving current from the power source through the electrically	The heating element is configured to vaporize at least a portion of the solution for oral delivery from S of the housing upon receiving current from PS through the electrically conductive threaded portion of the cartridge.



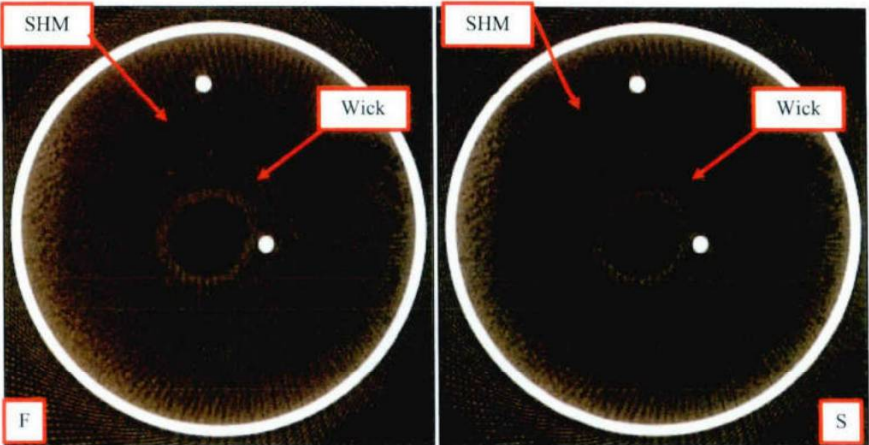
CLAIM 14	
The apparatus according to claim 12, wherein the heating element comprises a wicking material that is configured to attract the solution from the solution holding medium.	The heating element comprises a wicking material that is configured to attract the solution from the solution holding medium.



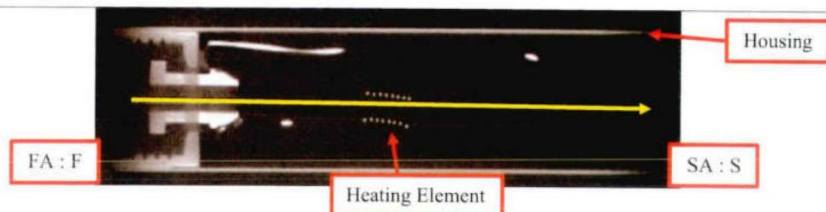


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CLAIM 16 The apparatus according to claim 12, wherein the first	F comprises a centrally located FA and S comprises a centrally located SA, and the airflow passageway extends between FA and SA axially through the interior of the housing. The heating element extends in the airflow passageway. No portion of the SHM intersects the central longitudinal axis.

end comprises a centrally located first aperture and the second end comprises a centrally located second aperture, wherein the airflow passageway extends between the first aperture and the second aperture axially through the interior of the housing, and wherein at least a portion of the heating element extends in the airflow passageway, and wherein no portion of the solution holding medium intersects the central longitudinal axis.



A 0.040" gage pin was passed through the centrally located FA to centrally located SA, further indicating the presence of a central/axial airflow passageway.



The SHM does not intersect the central air passageway/longitudinal axis.

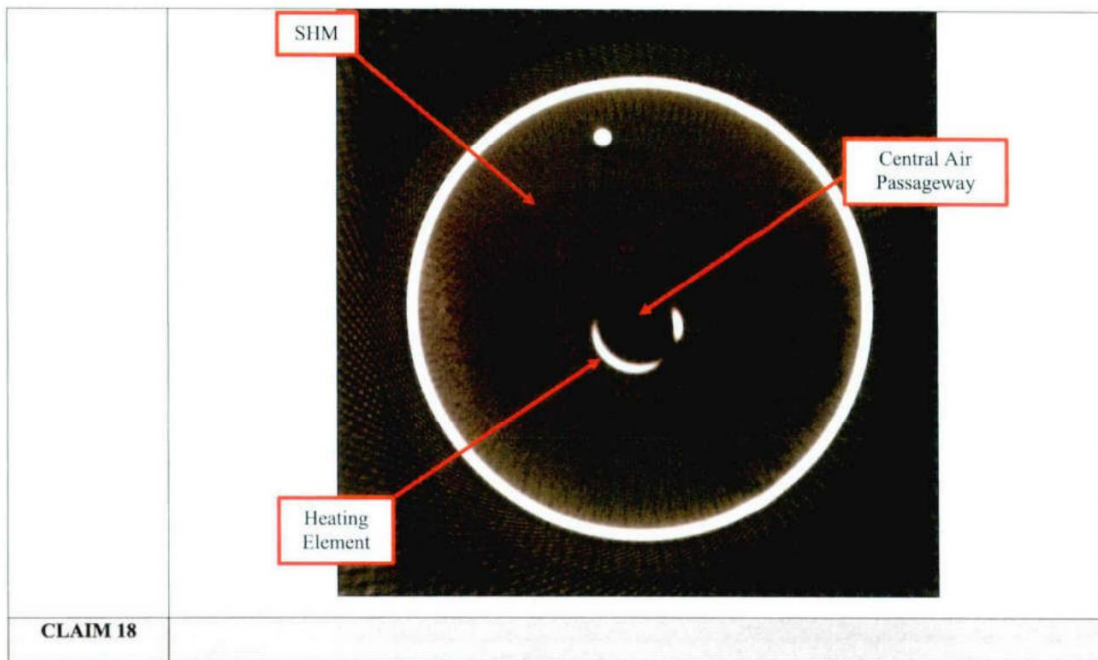
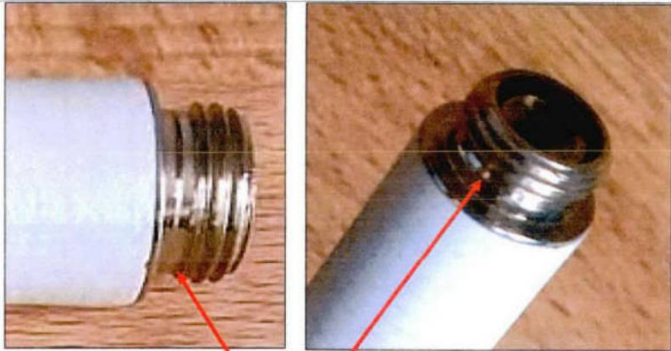




EXHIBIT J

UNITED STATES PATENT NO. 10,334,881	
CLAIM 1	Fifty-One Two Piece Electronic Cigarette (Manufactured S. Wang for Smoke Anywhere USA, Inc. in 2008 and 2009; Wang Declaration)
An apparatus comprising:	
a power source,	A power source (PS) 
wherein the power source includes a battery,	See Wang Declaration, paragraph 12.
wherein the power source includes an electrically conductive portion; and	PS includes an electrically conductive threaded portion at one end

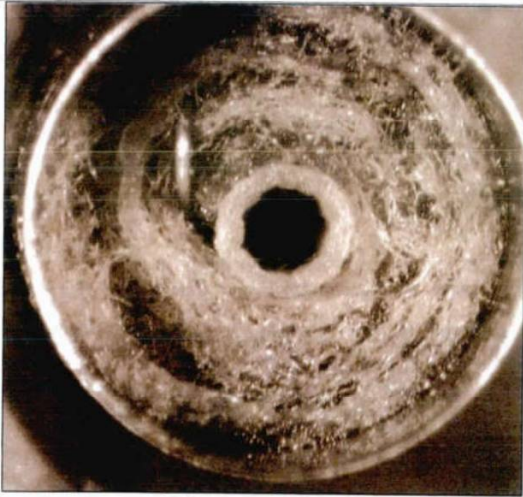
	 Electrically Conductive Threaded Portion
a cartridge having a housing that comprises an interior,	Cartridge has a housing with an interior.  Once label is removed, the metallic tube that forms the housing is viewable

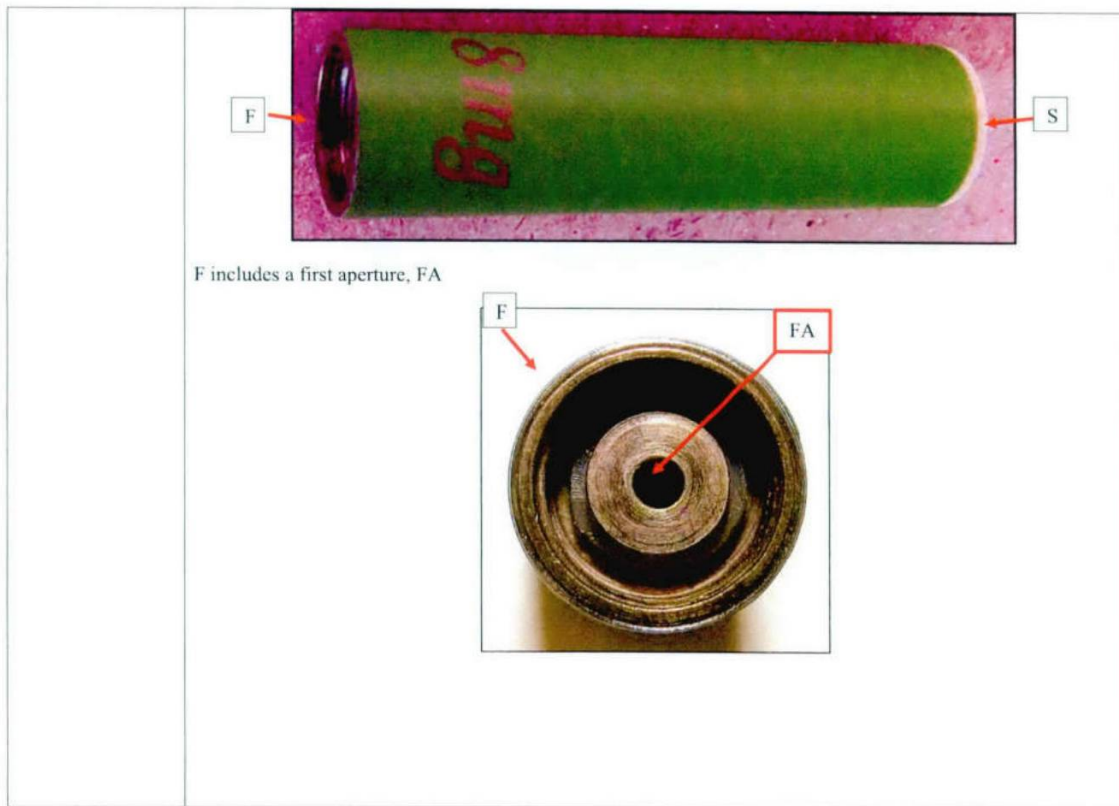


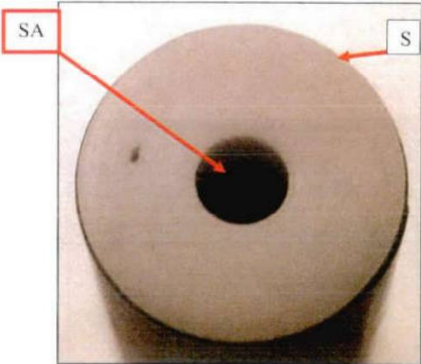
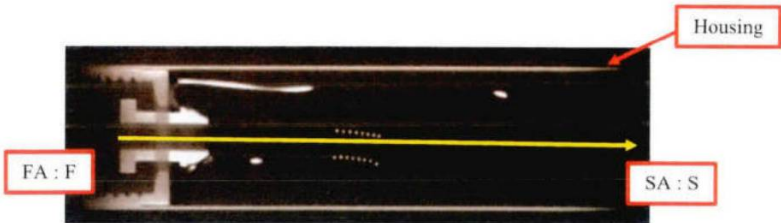
The micro-CT of the cartridge reveals the interior of the housing

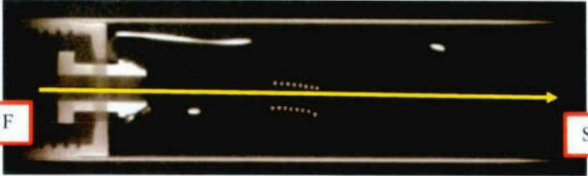
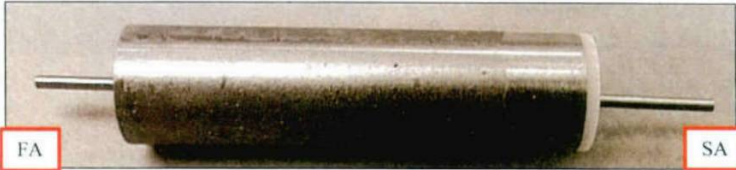


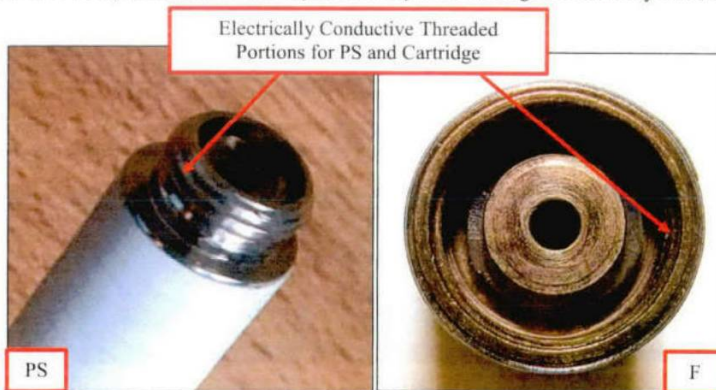
Once the second end is removed the interior is revealed inside the housing

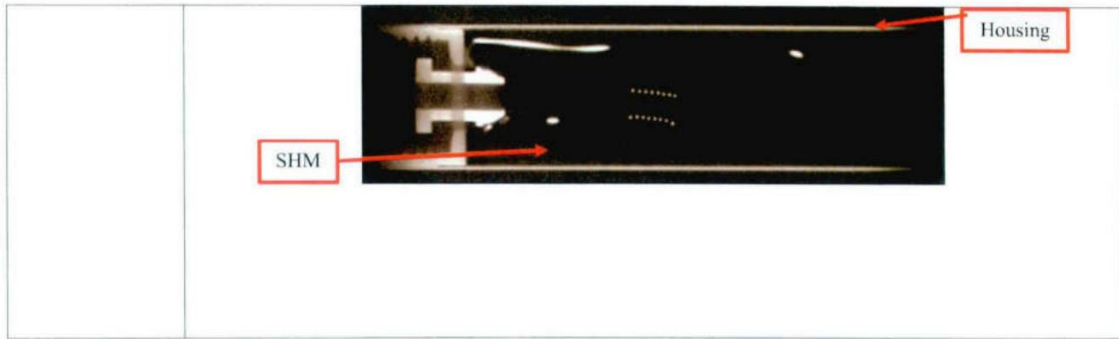
	
wherein the housing includes a first end and a second end that is opposite the first end, wherein the housing includes a first aperture on the first end and a second aperture on the second end,	Housing with first (F) and second (S) end, where S is opposite to F, wherein the housing includes a FA on F and a SA on S.

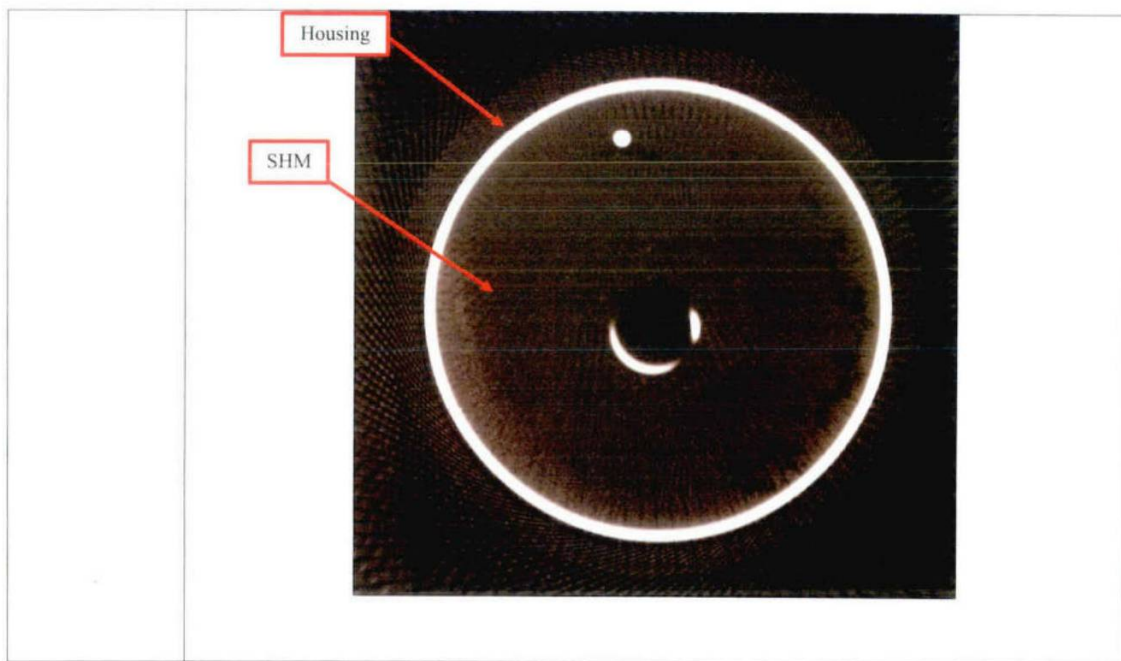


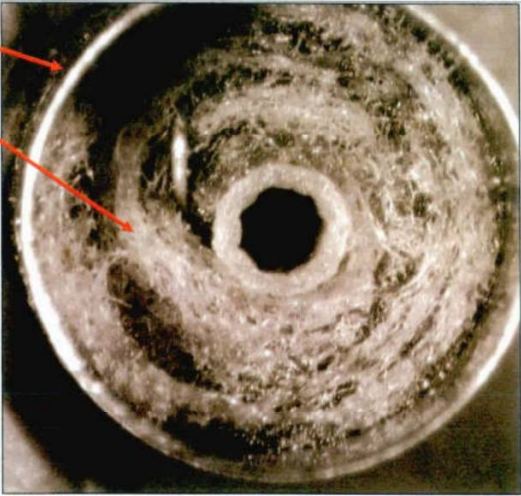
	S includes a second aperture, SA 
wherein the housing includes an airflow passageway that extends centrally and axially with respect to the housing intermediate of the first aperture on the first end of the housing and the second aperture on	The housing includes an airflow passageway that extends centrally and axially through the housing intermediate of FA on F and SA on S 

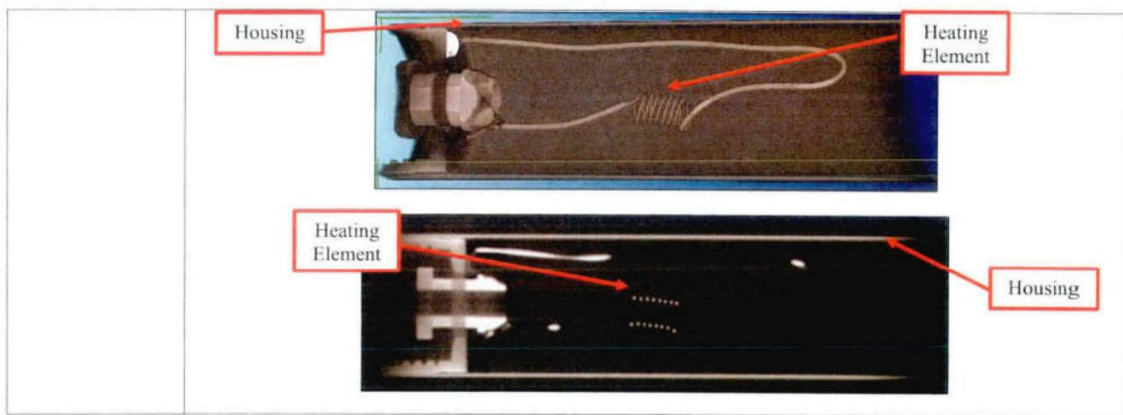
the second end of the housing,	A 0.040" gage pin was passed through the FA to SA, further indicating the presence of a central/axial airflow passageway. 
wherein the airflow passageway is configured to allow an airflow through the cartridge from the first aperture to the second aperture of the housing,	The airflow passageway is configured to allow airflow through the cartridge from FA on F to SA on S  A 0.040" gage pin was passed through the FA to SA, further indicating the presence of a central/axial airflow passageway to allow airflow through the cartridge from FA to SA. 

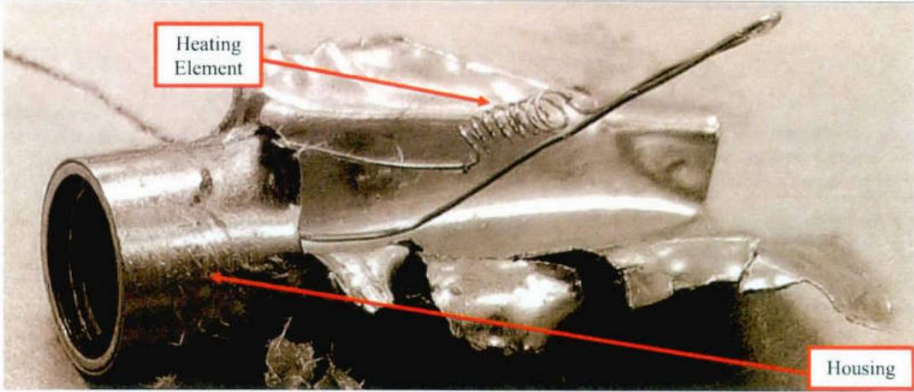
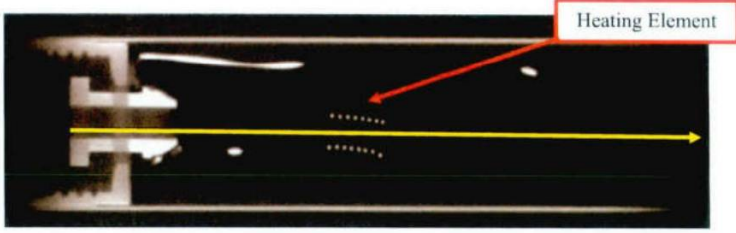
wherein the first end of the housing includes an electrically conductive portion that is adapted to mechanically and electrically couple to the electrically conductive portion of the power source,	The F of the housing includes an electrically conductive portion that is adapted to mechanically and electrically couple to the electrically conductive portion of the PS. PS and F include threaded electrically conductive connectors (confirmed with a calibrated multimeter [Fluxe 87 Multimeter, ID 94050236, Cal. Exp. 12/13/19] that the connectors have low resistivity [$<1\Omega$]) that has threads. These electrically conductive threaded portions couple the cartridge mechanically and electrically to the PS. 
wherein the housing includes a solution holding medium adapted to hold a solution in the interior of the housing,	The housing includes a solution holding medium (SHM) adapted to hold a solution in the interior of the housing

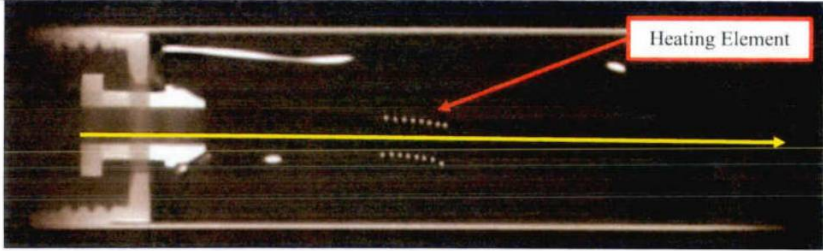
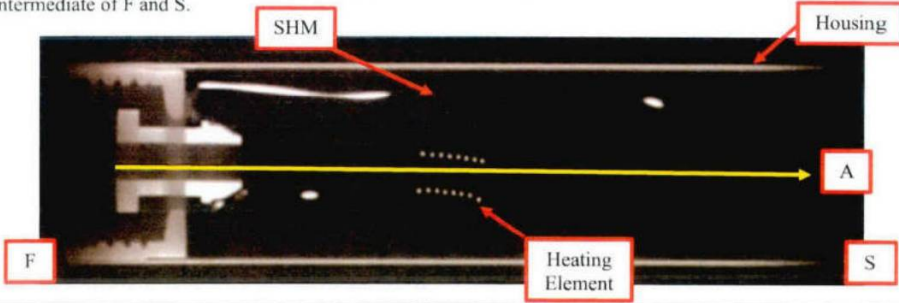




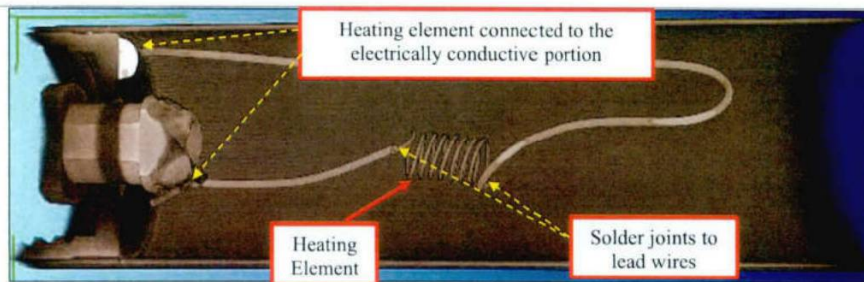
	
wherein the housing includes a heating element located in the interior of the housing,	The housing includes a heating element located in the interior of the housing



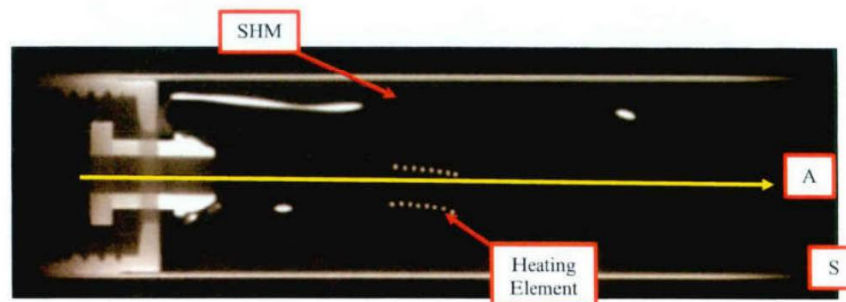
	 The wall of the housing opened to expose heating element in the interior of the housing.
wherein the heating element extends transversely across the airflow passageway,	The heating element extends across the airflow passageway 
wherein the airflow through	The airflow passes through the passageway and through the heating element.

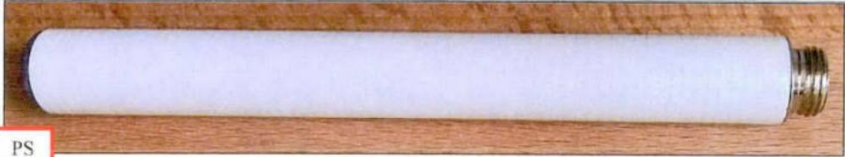
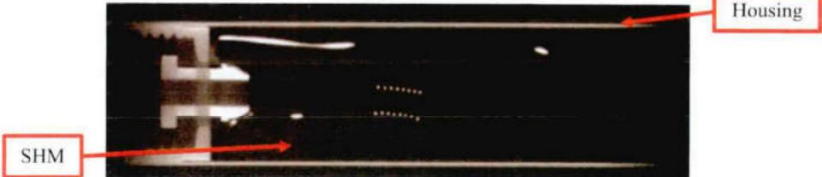
the passageway passes on both transverse sides of the element,	
wherein the solution holding medium surrounds the airflow passageway and the heating element in the interior of the housing and intermediate of the first end and the second end,	
wherein the heating element is electrically configured to vaporize at least a portion of the solution to be contained in the	The heating element is electrically configured to vaporize at least a portion of the solution to be contained in the SHM for oral provision to an individual in the airflow from the second aperture responsive to electrical power received from the battery through the electrically conductive threaded portions of the cartridge and power source.

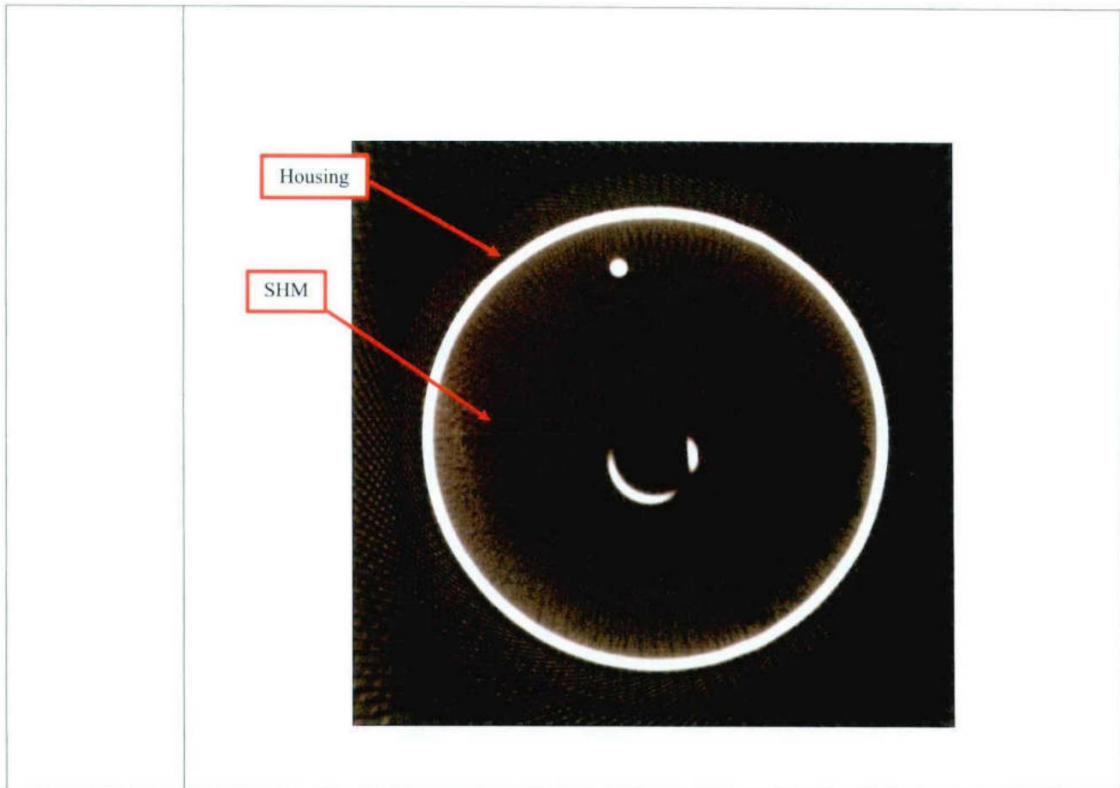
solution holding medium for oral provision to an individual in an airflow from the second aperture responsive to electrical power received from the battery through the electrically conductive portions of the cartridge and the power source.



Solution vaporized by the heating element is orally provided to an individual through airflow (A) from SA.

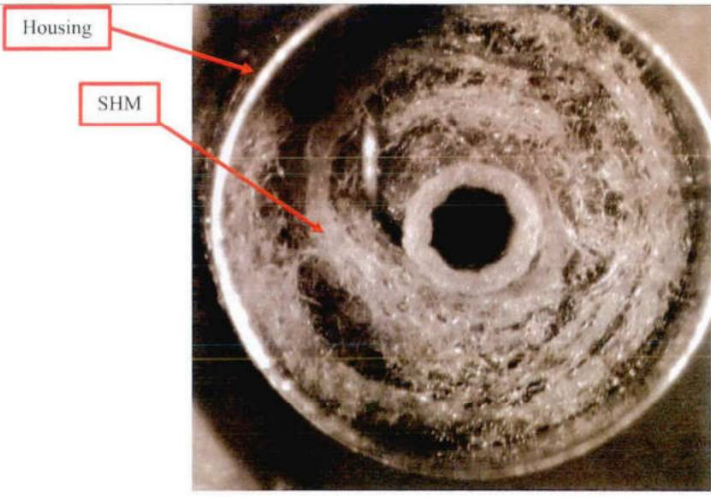


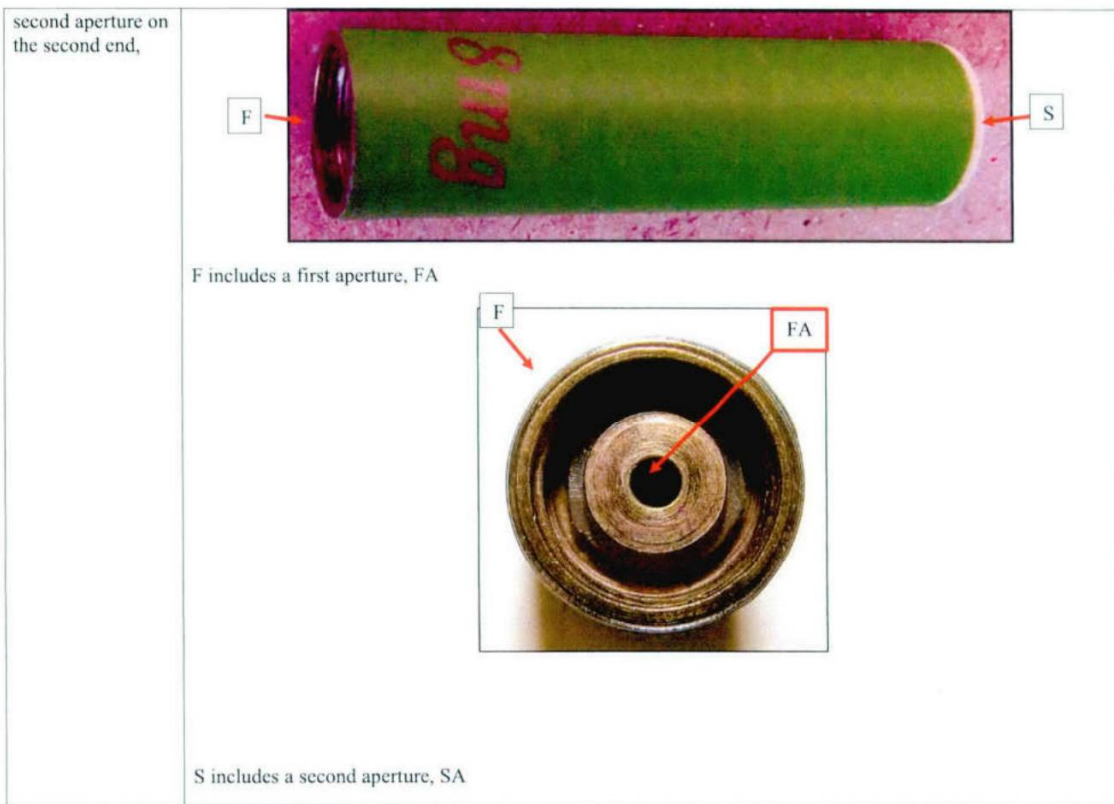
	
CLAIM 8	
A cartridge configured to mechanically and electrically couple to a power source of an electronic vaporizer, the cartridge comprising:	
a housing having an interior and a solution holding medium reservoir adapted to hold a solution,	The housing includes an interior and a solution holding medium reservoir (SHM) adapted to hold a solution 

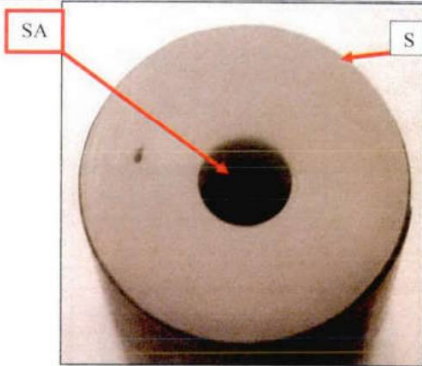


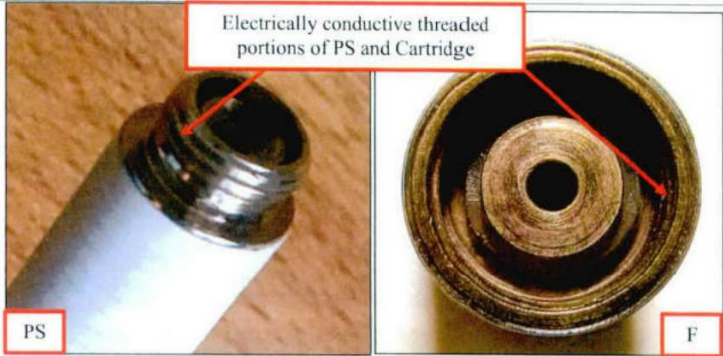
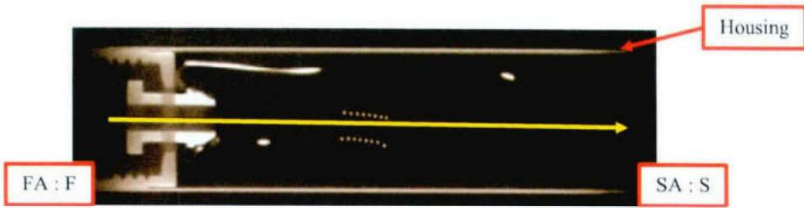
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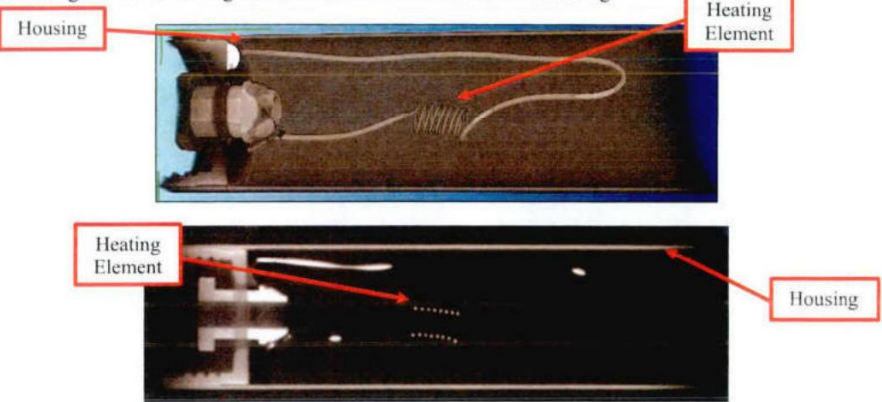
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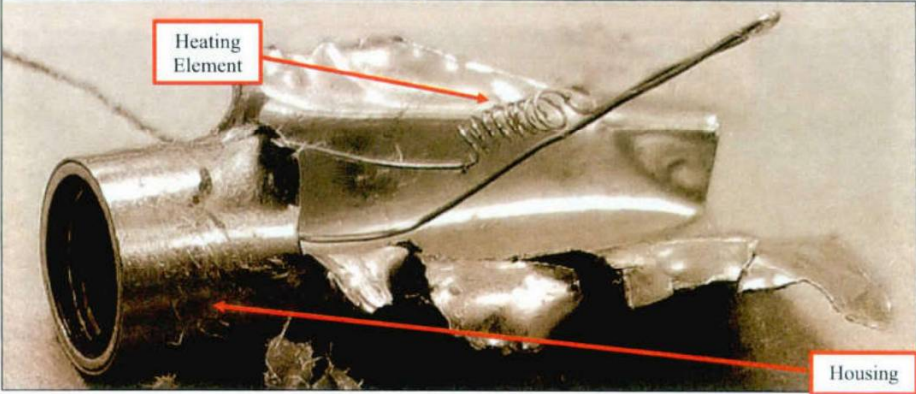
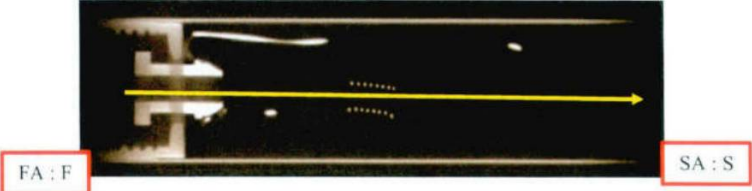
	
the housing having a first end and a second end that is opposite the first end, the housing having a first aperture on the first end and a	Housing with first (F) and second (S) end, where S is opposite to F, the housing having a FA on the F and SA on the S.

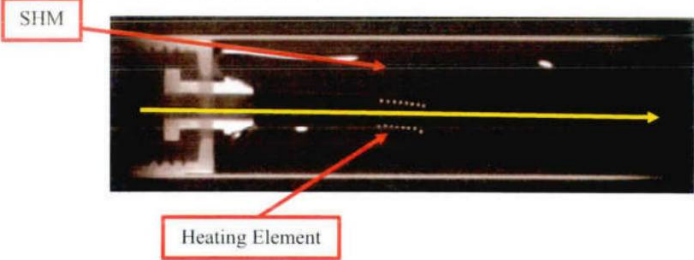
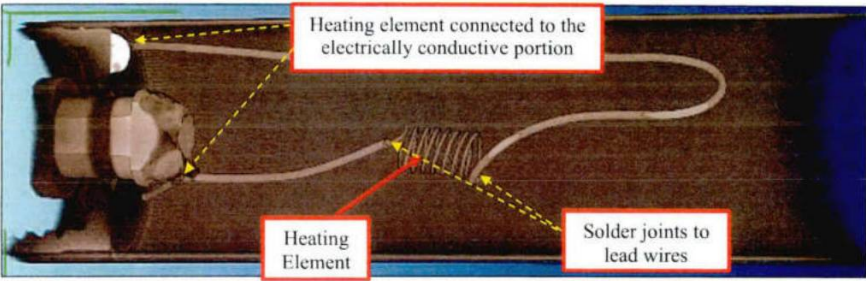


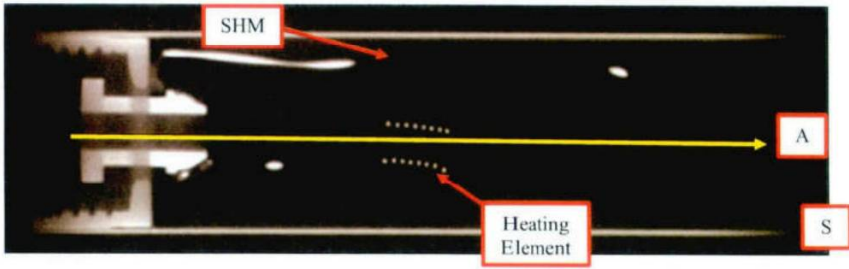
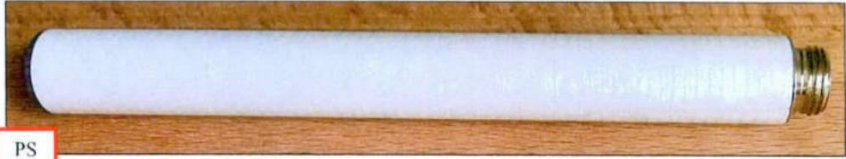
	
the first end of the housing having an electrically conductive portion adapted to mechanically and electrically couple to the electrically conductive portion of the power source;	The F of the housing having an electrically conductive portion adapted to mechanically and electrically couple to the electrically conductive portion of the PS. PS and F include threaded electrically conductive connectors (confirmed with a calibrated multimeter [Fluke 87 Multimeter, ID 94050236, Cal. Exp. 12/13/19] that the connectors have low resistivity [$<1\Omega$]) that has threads. These electrically conductive threaded portions couple the cartridge mechanically and electrically to the power source.

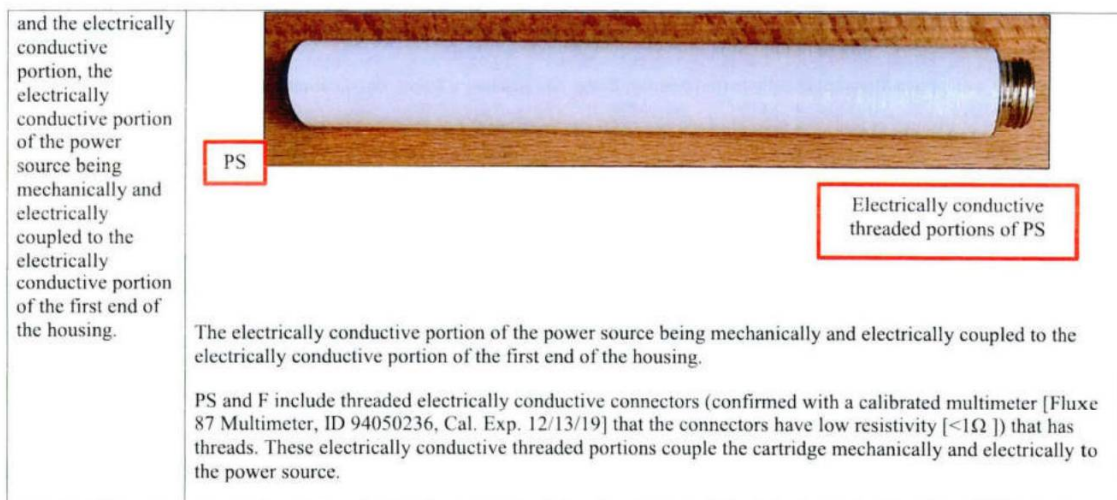
	 Electrically conductive threaded portions of PS and Cartridge PS F
an airflow passageway in the interior of the housing extending centrally and axially with respect to the housing intermediate of the first aperture on the first end of the housing and the second aperture on the second end of the housing, the airflow passageway being configured to	The housing includes an airflow passageway extending centrally and axially through the housing intermediate of FA on F and SA on S, the airflow passageway being configured to allow an airflow through the cartridge from FA to SA of the housing.  FA : F SA : S Housing

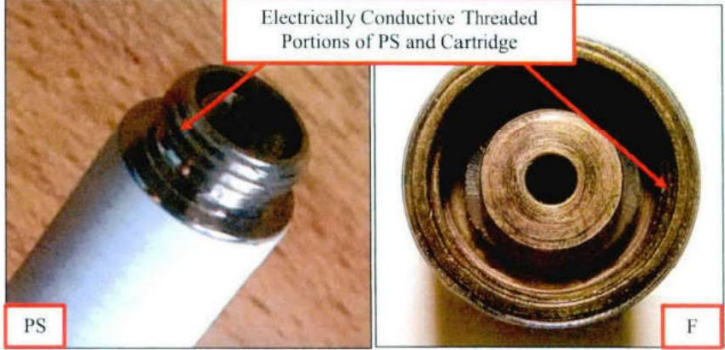
allow an airflow through the cartridge from the first aperture to the second aperture of the housing; and	A 0.040" gage pin was passed through the FA to SA, further indicating the presence of a central/axial airflow passageway configured to allow airflow through the cartridge from FA to SA. 
a heating element located in the interior of the housing,	The housing includes a heating element located in the interior of the housing. 

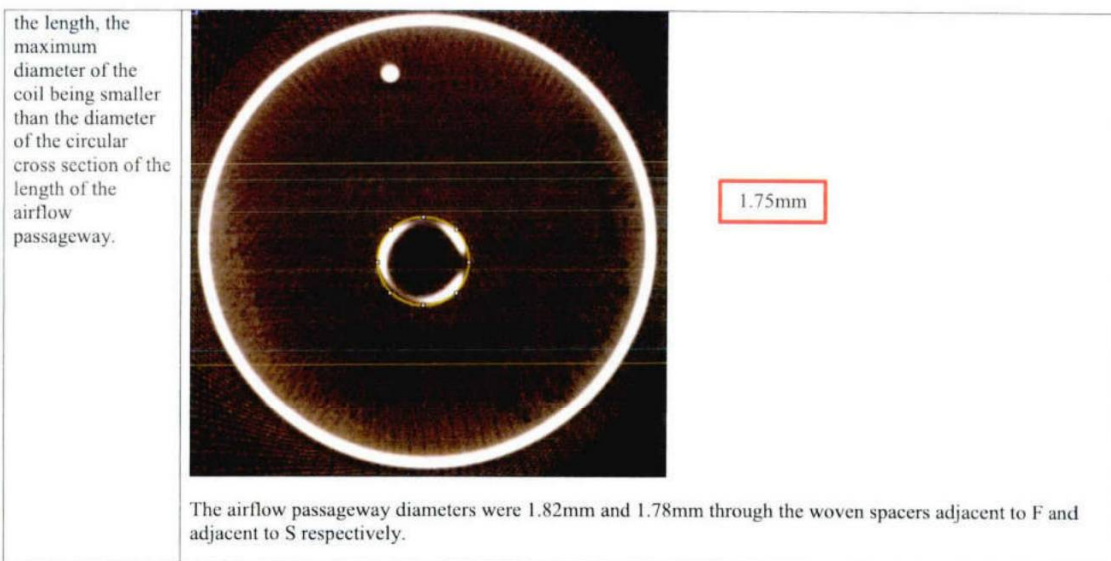
	
the heating element being located within and extending transversely across the airflow passageway,	The heating element being located within and extending across an airflow passageway. 

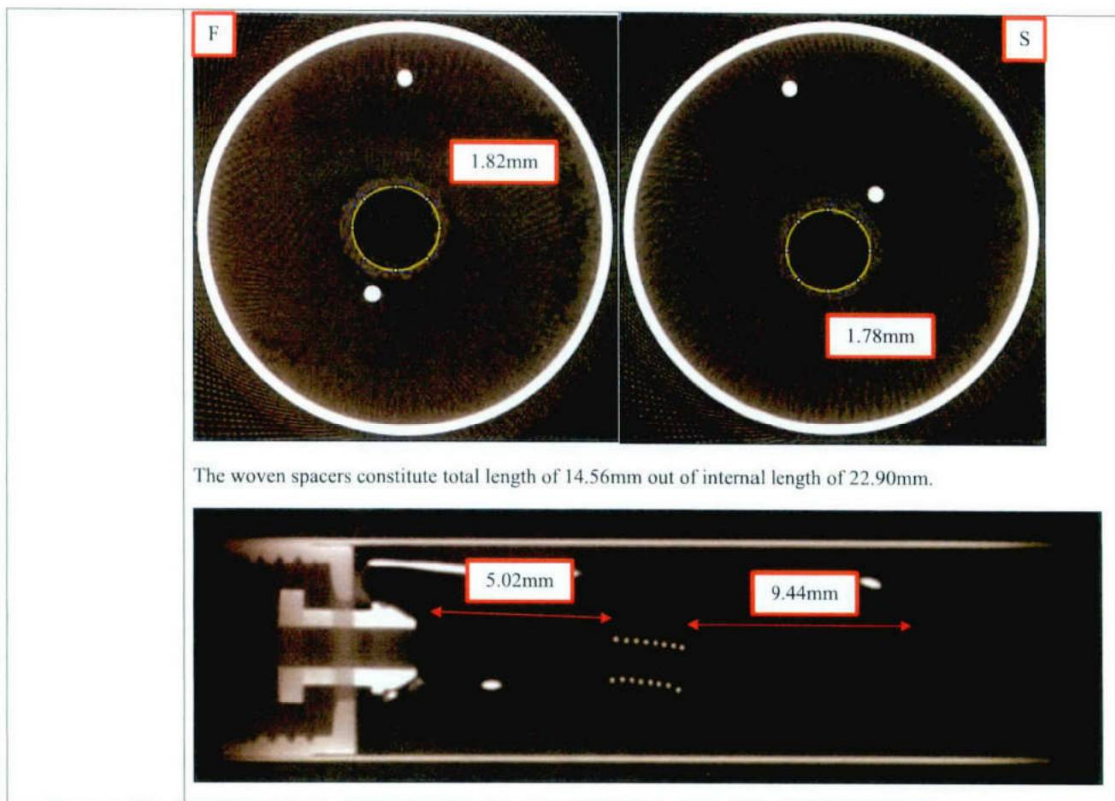
the airflow through the passageway passing on both transverse sides of the heating element, both the heating element and the airflow passageway being surrounded by the solution holding medium reservoir,	The airflow through the passageway passing through heating element, both the heating element and the airflow passageway being surrounded by the SHM reservoir. 
the heating element being electrically configured to vaporize at least a portion of the solution to be contained in the solution holding medium reservoir for oral provision to an individual in an airflow from the second aperture responsive to	The heating element is electrically configured to vaporize at least a portion of the solution to be contained in the SHM reservoir for oral provision to an individual in an airflow from the SA responsive to electrical power received from the battery through the electrically conductive portions of the cartridge and the power source. 

electrical power received from the battery through the electrically conductive portions of the cartridge and the power source.	Solution vaporized by the heating element is orally provided to the individual in an airflow (A) from SA responsive to the electrical power received from the battery from the electrically conductive portions of the cartridge and PS.  
CLAIM 9 The cartridge of claim 8, further in combination with the power source including a battery	A power source PS, including a battery (See Wang Declaration) and the electrically conductive portion.

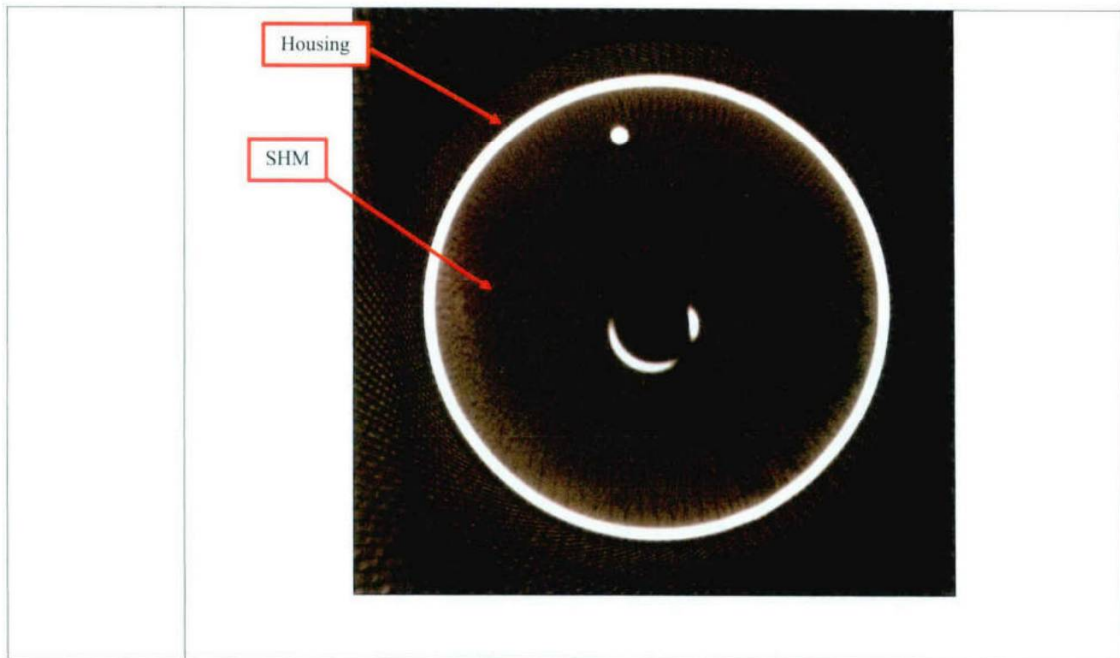


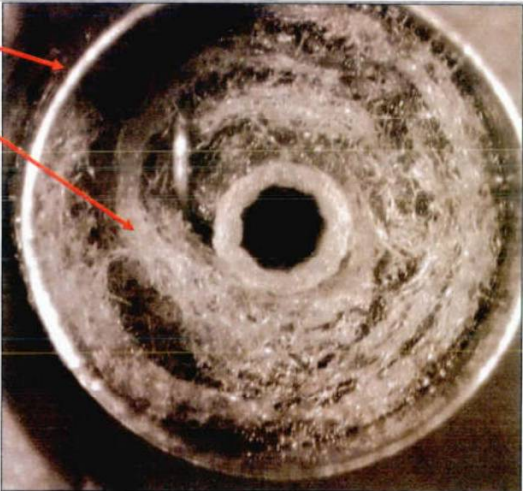
	
CLAIM 10	
The cartridge of claim 9, wherein the heating element is a coil having a maximum diameter, the airflow passageway having a length having a circular cross section having a diameter along a majority of the length, the maximum diameter of the coil being smaller than the diameter of the circular cross section of the length of the airflow passageway. The heating element (coil) has a maximum diameter of 1.75mm.	



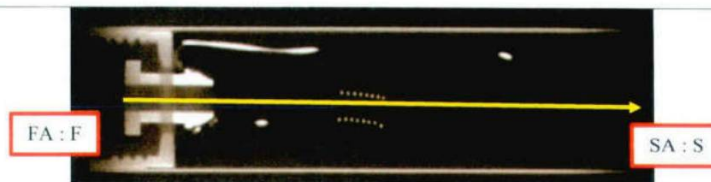


CLAIM 16	
A cartridge configured to mechanically and electrically couple to a power source of an electronic vaporizer, the cartridge comprising:	
a housing having an interior and a solution holding medium adapted to hold a solution in the interior of the housing,	The housing includes an interior and a solution holding medium (SHM) adapted to hold a solution in the interior of the housing.  SHM Housing



	Housing SHM 
the housing having a first end and a second end that is opposite the first end, the housing having a central longitudinal axis extending through the first end and the second end, the	The housing includes an airflow passageway that extends centrally and axially through the housing intermediate of FA on F and SA on S Housing 

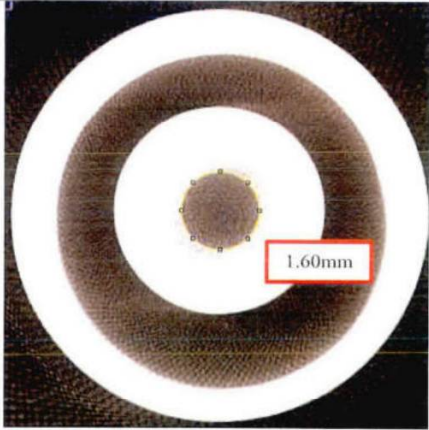
housing having a first aperture on the first end and a second aperture on the second end, the first aperture having a cross-sectional area measured perpendicular to the central longitudinal axis of the housing,

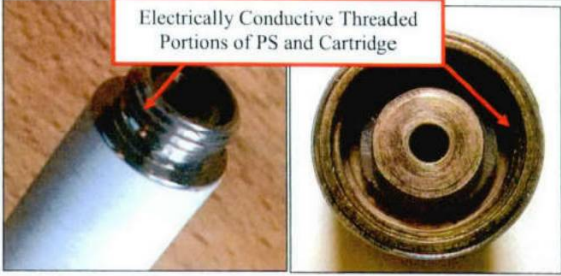


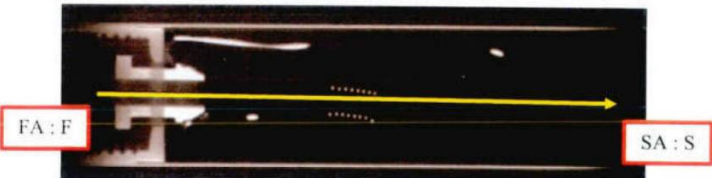
A 0.040" gage pin was passed through the FA to SA, further indicating the presence of a central longitudinal axis extending through the FA and SA.

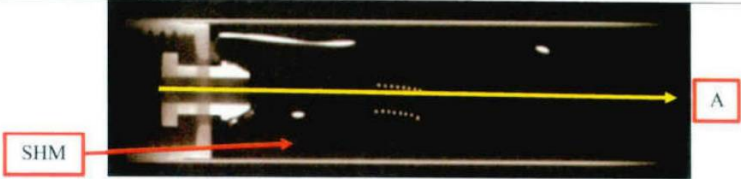
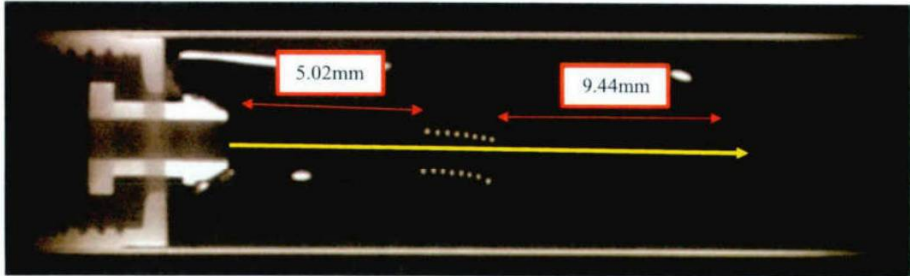


The first aperture diameter measured perpendicular to the central longitudinal axis.

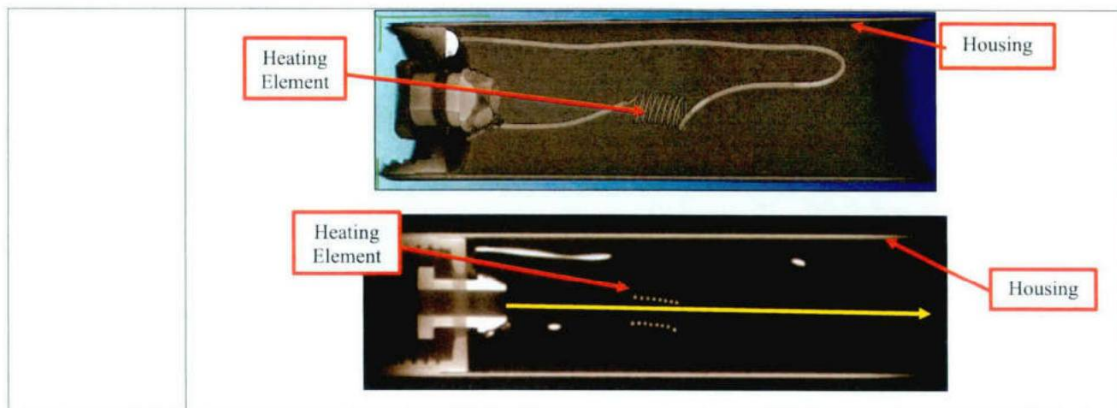
	
the first end of the housing having an electrically conductive portion adapted to mechanically and electrically couple to an electrically conductive portion of the power source;	F of the housing includes an electrically conductive threaded portion that is adapted to mechanically and electrically couple to the electrically conductive threaded portion of the PS PS and F include threaded electrically conductive connectors (confirmed with a calibrated multimeter [Fluxe 87 Multimeter, ID 94050236, Cal. Exp. 12/13/19] that the connectors have low resistivity [$<1\Omega$]) that has threads. These electrically conductive threaded portions couple the cartridge mechanically and electrically to the power source.

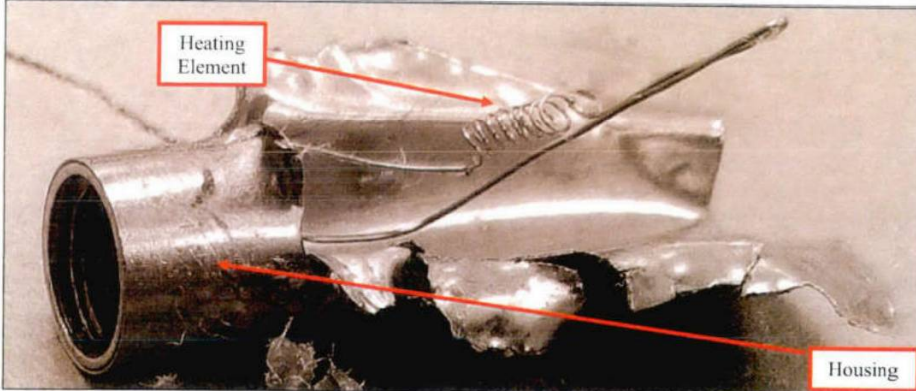
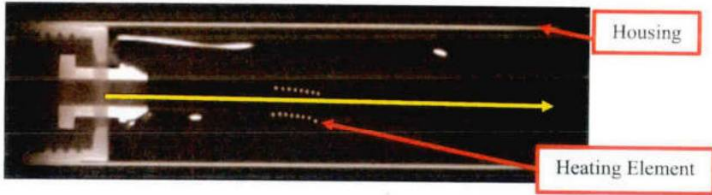
	 Electrically Conductive Threaded Portions of PS and Cartridge PS F
an airflow passageway in the interior of the housing, the airflow passageway having a length extending centrally and axially with respect to the housing intermediate of the first aperture on the first end of the housing and the second aperture on the second end of the housing,	The airflow passageway in the interior of the housing, the airflow passageway having a length extending centrally and axially with respect to the housing intermediate of FS on the F and SA on the S.  FA : F SA : S Housing A 0.040" gage pin was passed through the FA to SA, further indicating the presence of an airflow passageway having a length extending centrally and axially with respect to the housing intermediate of FS on the F and SA on the S.

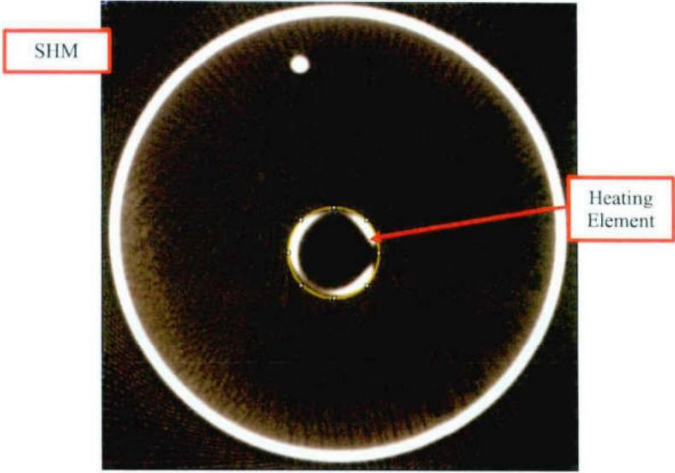
	
the airflow passageway being configured to allow an airflow through the cartridge from the first aperture to the second aperture of the housing,	The airflow passageway is configured to allow an airflow through the cartridge from FA to SA  A 0.040" gage pin was passed through the FA to SA, further indicating the presence of a central/axial airflow passageway to allow an airflow through the cartridge from the FA to the SA of the housing. 
the airflow passageway having an exterior adjacent to the	The airflow passageway has an exterior adjacent to the solution holding medium along a majority of the length of the airflow passageway.

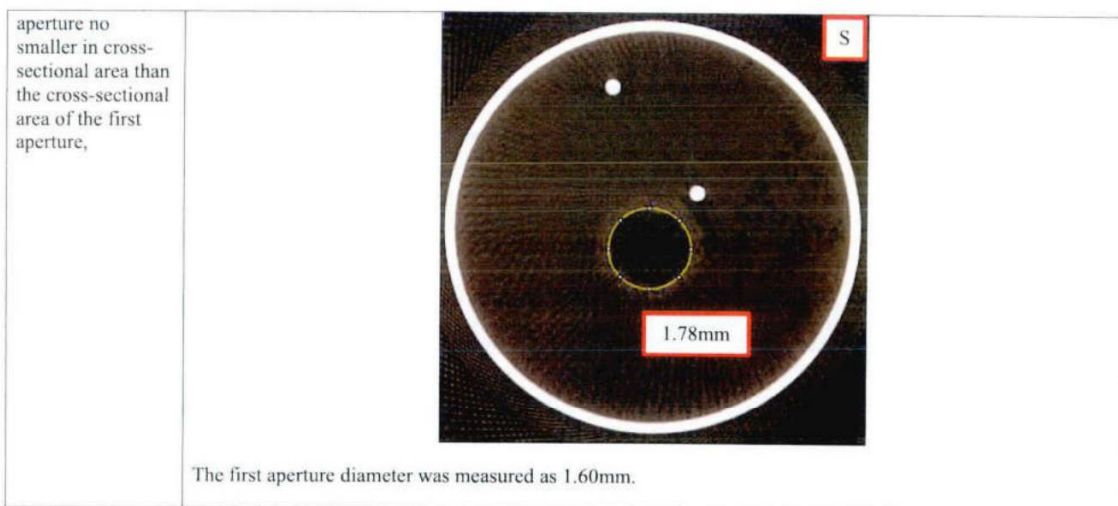
solution holding medium along a majority of the length of the airflow passageway,	 The woven spacers constitute total length of 14.56mm out of internal length of 22.90mm. 
the airflow passageway having an interior having a uniform cross-sectional area measured perpendicular to the central longitudinal axis of the housing and extending	The airflow passageway has an interior having a uniform cross-sectional area measured perpendicular to the central longitudinal axis of the housing and extending continuously along a majority of the length of the airflow passageway

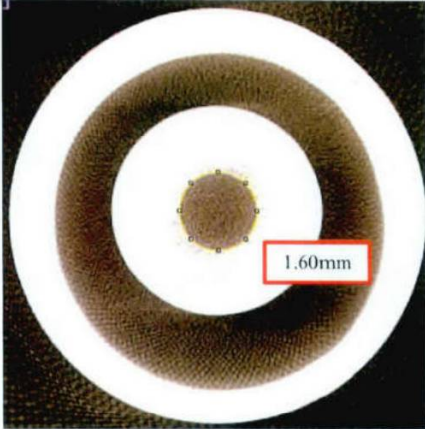
continuously along a majority of the length of the airflow passageway; and	The airflow passageway diameters were 1.82mm and 1.78mm for the woven spacers adjacent to F and adjacent to S respectively. The woven spacers constitute total length of 14.56mm out of internal length of 22.90mm.
a heating element located in the interior of the housing and extending transversely across the airflow passageway,	The housing includes a heating element located in the interior of the housing that extends across the airflow passageway.

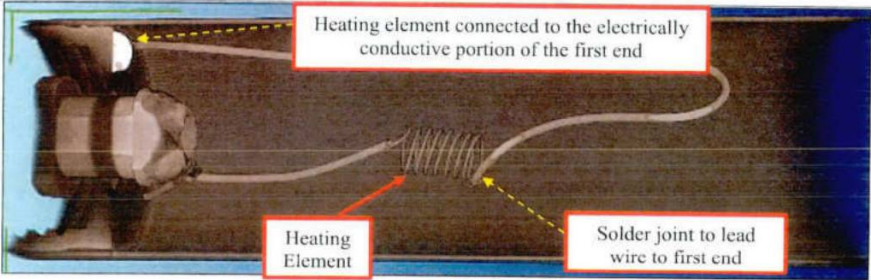
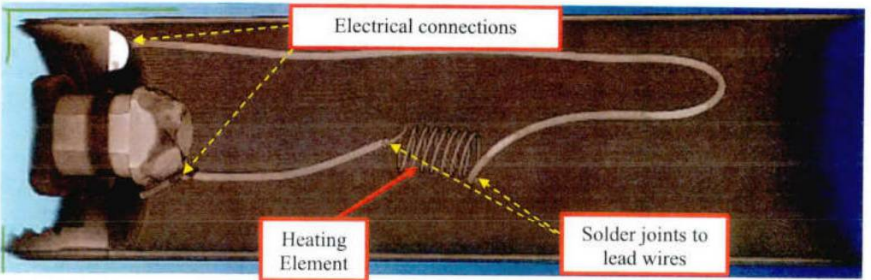


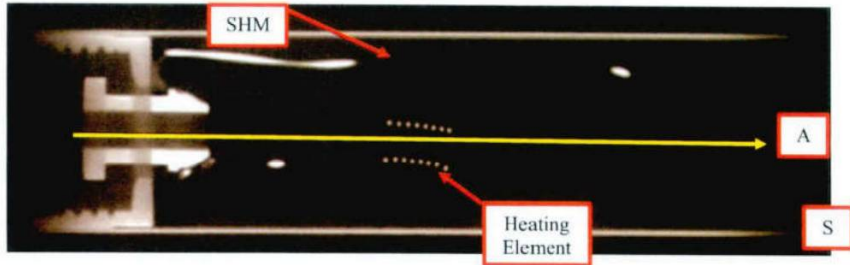
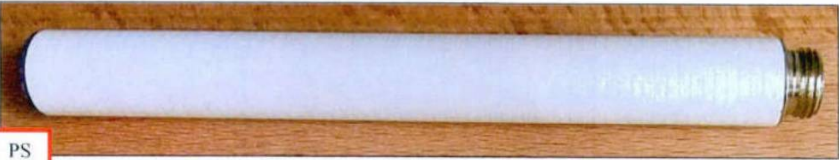
	
the airflow through the passageway passing on both transverse sides of the heating element, a plane perpendicular to the central longitudinal axis of the housing passing through	The airflow through the passageway passes through the helical heating element, 

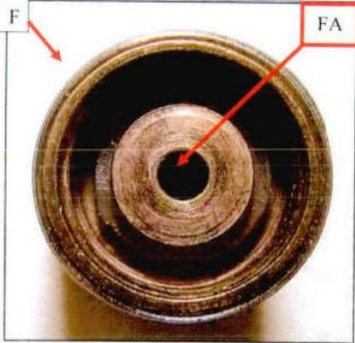
the heating element and the solution holding medium,	A plane perpendicular to the central longitudinal axis of the housing passes through the heating element (coil) and SHM as shown below. 
the airflow passageway having an interior between the heating element and the second	The airflow passageway having an interior between the heating element and the second aperture no smaller in cross-sectional area than the cross-sectional area of the first aperture. The woven spacer near the second aperture has a diameter of 1.78mm.



	
the heating element being connected to the electrically conductive portion of the first end of the housing,	The heating element is connected to the electrically conductive portion of the first end of the housing.

	 Heating element connected to the electrically conductive portion of the first end Heating Element Solder joint to lead wire to first end
the heating element being electrically configured to vaporize at least a portion of the solution to be contained in the solution holding medium for oral provision to an individual in an airflow from the second aperture responsive to electrical power received from the power source through the	The heating element is electrically configured to vaporize at least a portion of the solution to be contained in the solution holding medium for oral provision to an individual in an airflow from the second aperture responsive to electrical power received from the power source through the electrically conductive portion of the cartridge  Electrical connections Heating Element Solder joints to lead wires

electrically conductive portion of the cartridge.	Solution vaporized by the heating element in SHM is orally provided to the individual through airflow (A) from SA.  
CLAIM 22 The cartridge of claim 16, wherein the first aperture on the first end is located centrally and axially with	F includes a centrally and axially located first aperture, FA

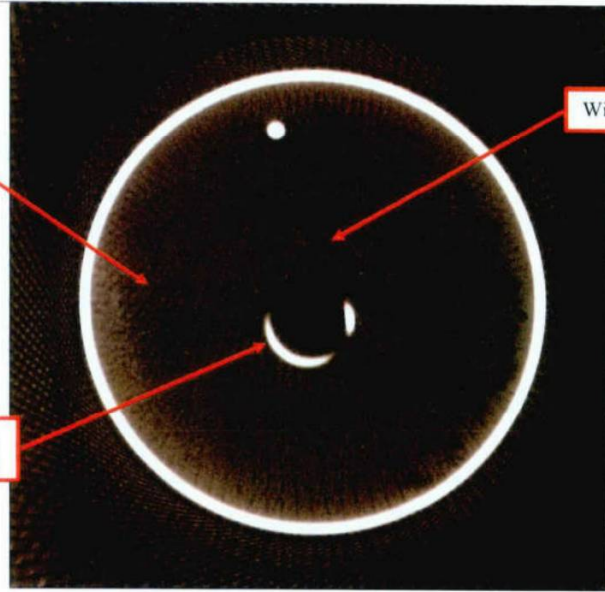
respect to the housing.	
CLAIM 26	
The cartridge of claim 16, wherein the heating element is in operative connection with a wicking material, and the wicking material is operative to attract a portion of the solution from the solution holding medium located	The heating element is in operative connection with a wicking material, and the wicking material is operative to attract a portion of the solution from the solution holding medium located immediately adjacent opposite ends of the heating element toward the heating element.

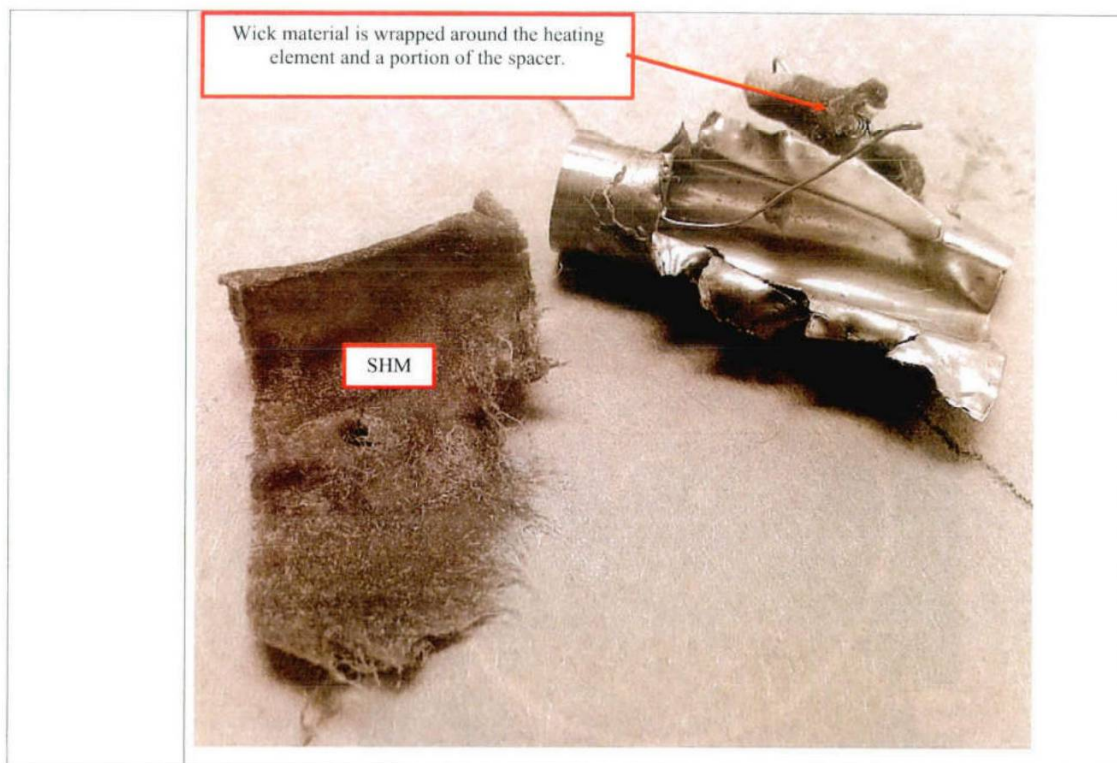
immediately adjacent opposite ends of the heating element toward the heating element.

SHM

Heating Element

Wick





Tab 3

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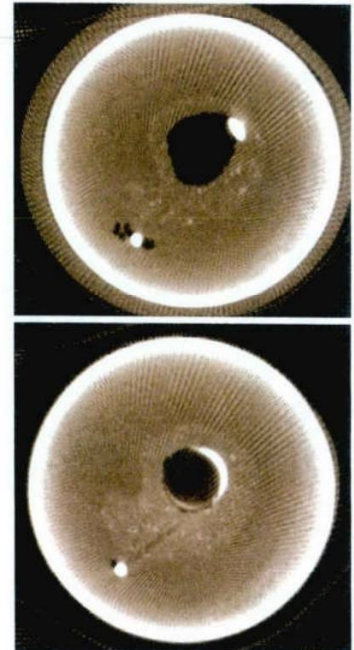
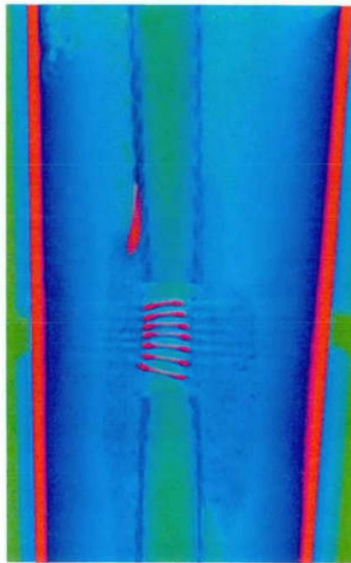
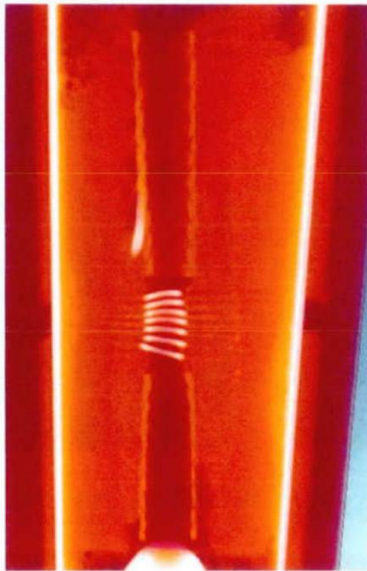
Cartridge CT Scan Results – Additional Images for Wick Configuration

January 20, 2020

1906956 EX0 - 8698

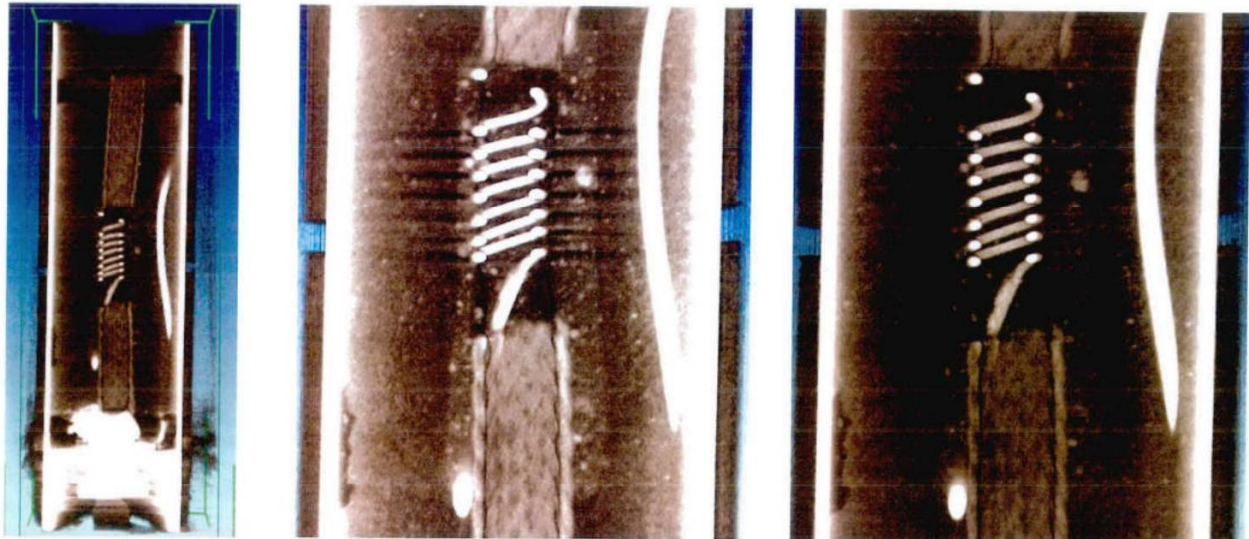
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Cartridge 2, Boxed, Green, 8 mg



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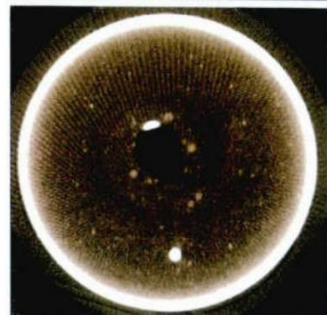
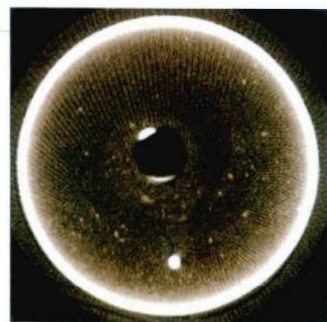
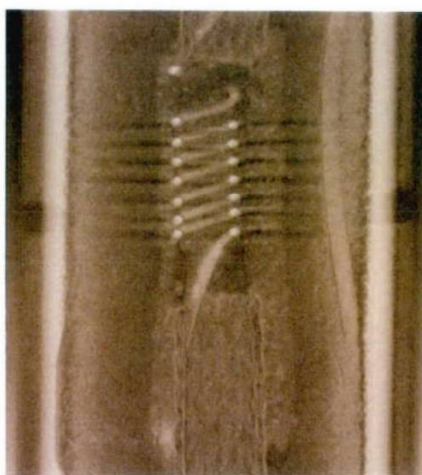
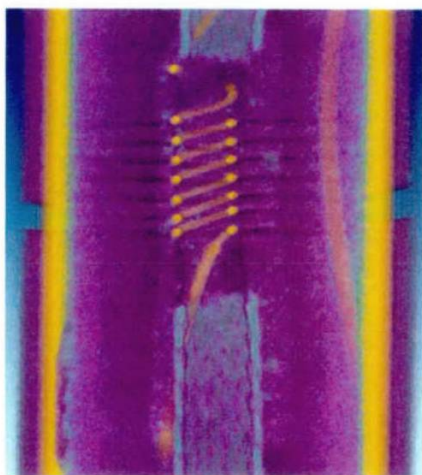
Cartridge 3, Boxed, Yellow, 4 mg



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Cartridge 3, Boxed, Yellow, 4 mg



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