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(54) **HEAT NOT BURN VAPORIZER DEVICES**

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(21) Appl. No.: **19/198,908**

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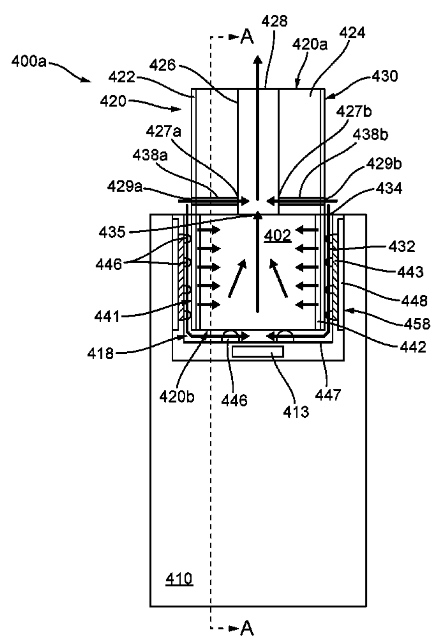
A24F 40/465	(2020.01)
A24F 40/485	(2020.01)
A24F 40/51	(2020.01)
A24F 40/70	(2020.01)

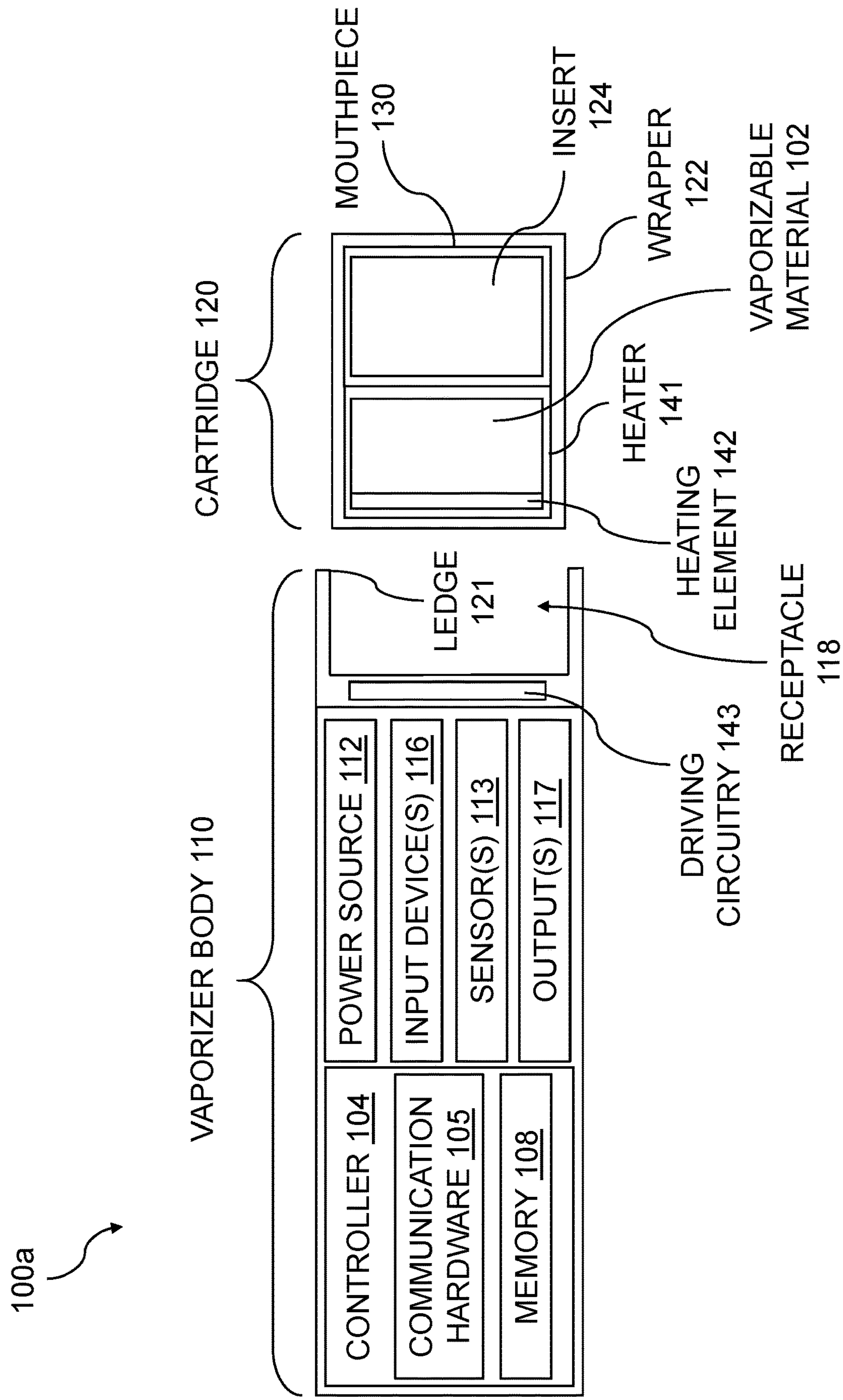
(52) **U.S. Cl.**

CPC ***A24F 40/42*** (2020.01); ***A24F 40/465*** (2020.01); ***A24F 40/485*** (2020.01); ***A24F 40/70*** (2020.01); *A24F 40/10* (2020.01); *A24F 40/20* (2020.01); *A24F 40/51* (2020.01)

(57) **ABSTRACT**

Vaporizer devices for generating an inhalable aerosol are provided. In one exemplary implementation, a vaporizer device includes a cartridge and a device body having a receptacle configured to receive the cartridge. The cartridge includes vaporizable material, heater chamber(s), heating element(s), inlet(s), airflow outlet channel(s), and airflow outlet(s). The heating element(s) are configured to heat the vaporizable material to generate a vapor, and the inlet(s) are configured to allow external air to enter the heater chamber (s) and entrain the vapor. The airflow outlet channel(s) are in fluid communication with the heater chamber(s), and include at least one condensation chamber configured to condense the entrained vapor with ambient air to form at least a portion of the inhalable aerosol. The airflow outlet(s) are configured to deliver the inhalable aerosol to a user, and in fluid communication with the at least one condensation chamber.

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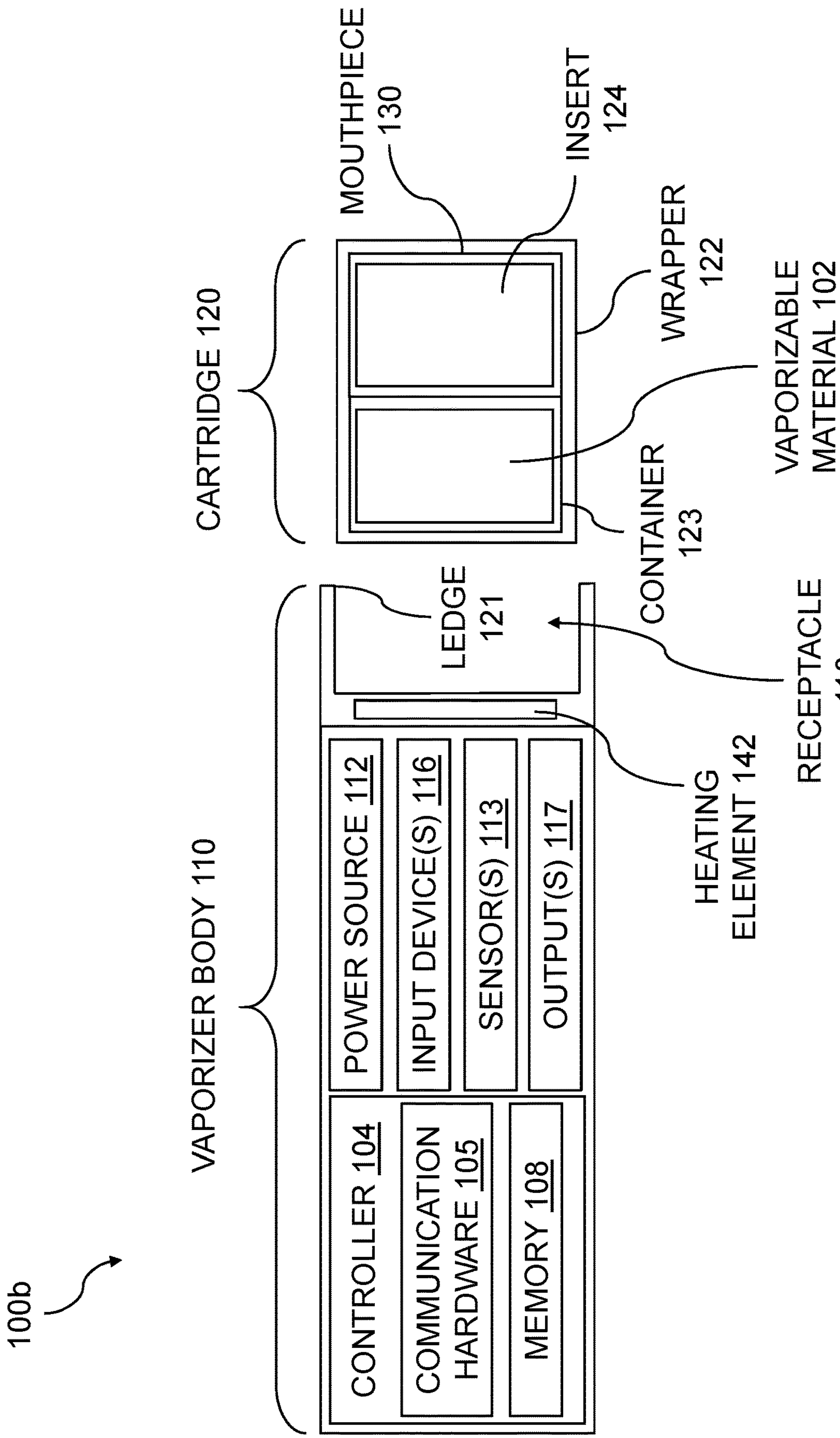
CONTROLLER 104
COMMUNICATION HARDWARE 105
MEMORY 108
POWER SOURCE 112
INPUT DEVICE(S) 116
SENSOR(S) 113
OUTPUT(S) 117
DRIVING CIRCUITRY 143
LEDGE 121
RECEPTACLE 118
CARTRIDGE 120
MOUTHPIECE 130
INSERT 124
WRAPPER 122
VAPORIZABLE MATERIAL 102
HEATER 141
HEATING ELEMENT 142

FIG. 1A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COMMUNICATION HARDWARE 105
MEMORY 108
POWER SOURCE 112
INPUT DEVICE(S) 116
SENSOR(S) 113
OUTPUT(S) 117
HEATING ELEMENT 142
LEDGE 121
RECEPTACLE 118
CARTRIDGE 120
MOUTHPIECE 130
INSERT 124
WRAPPER 122
VAPORIZABLE MATERIAL 102
CONTAINER 123

FIG. 1B

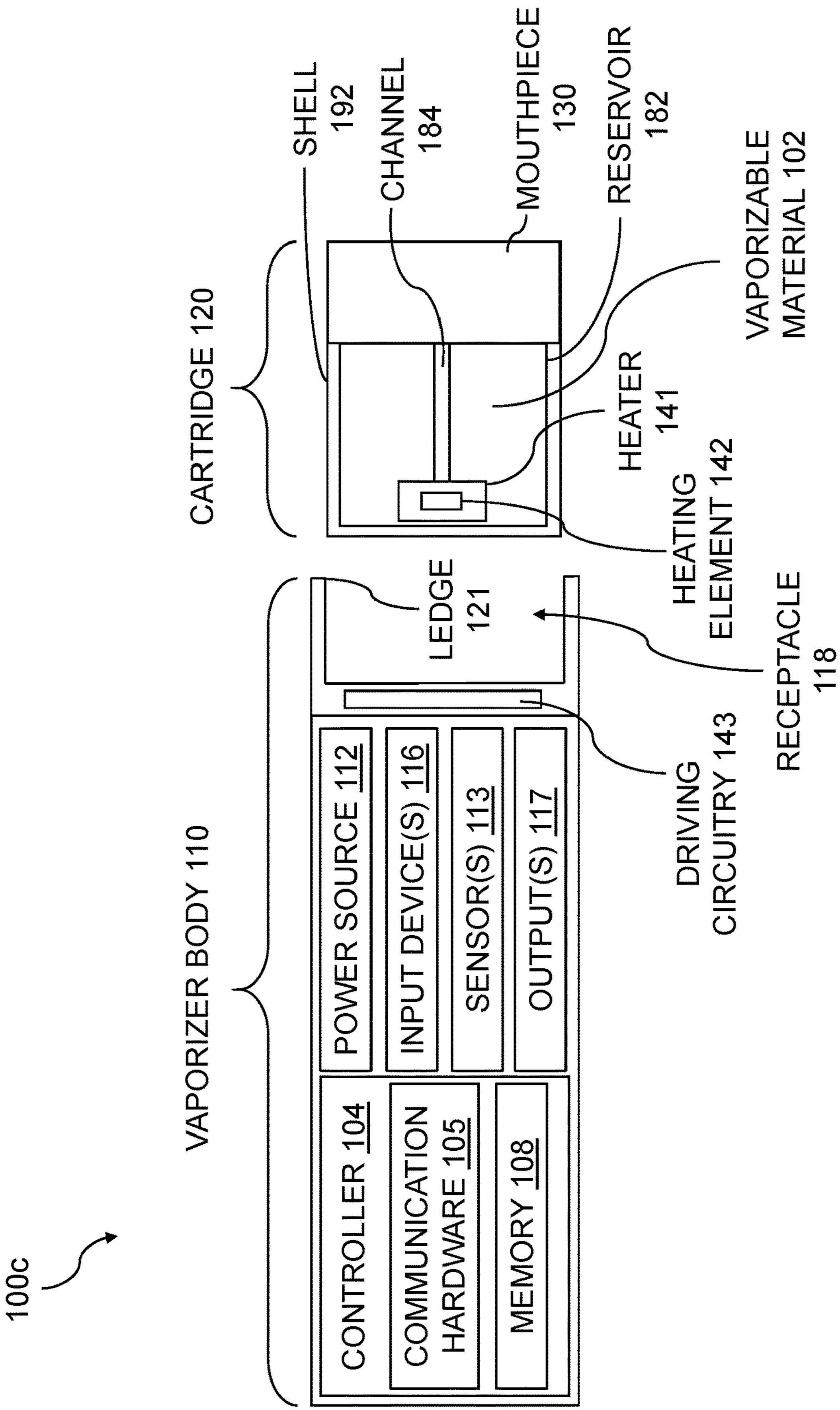
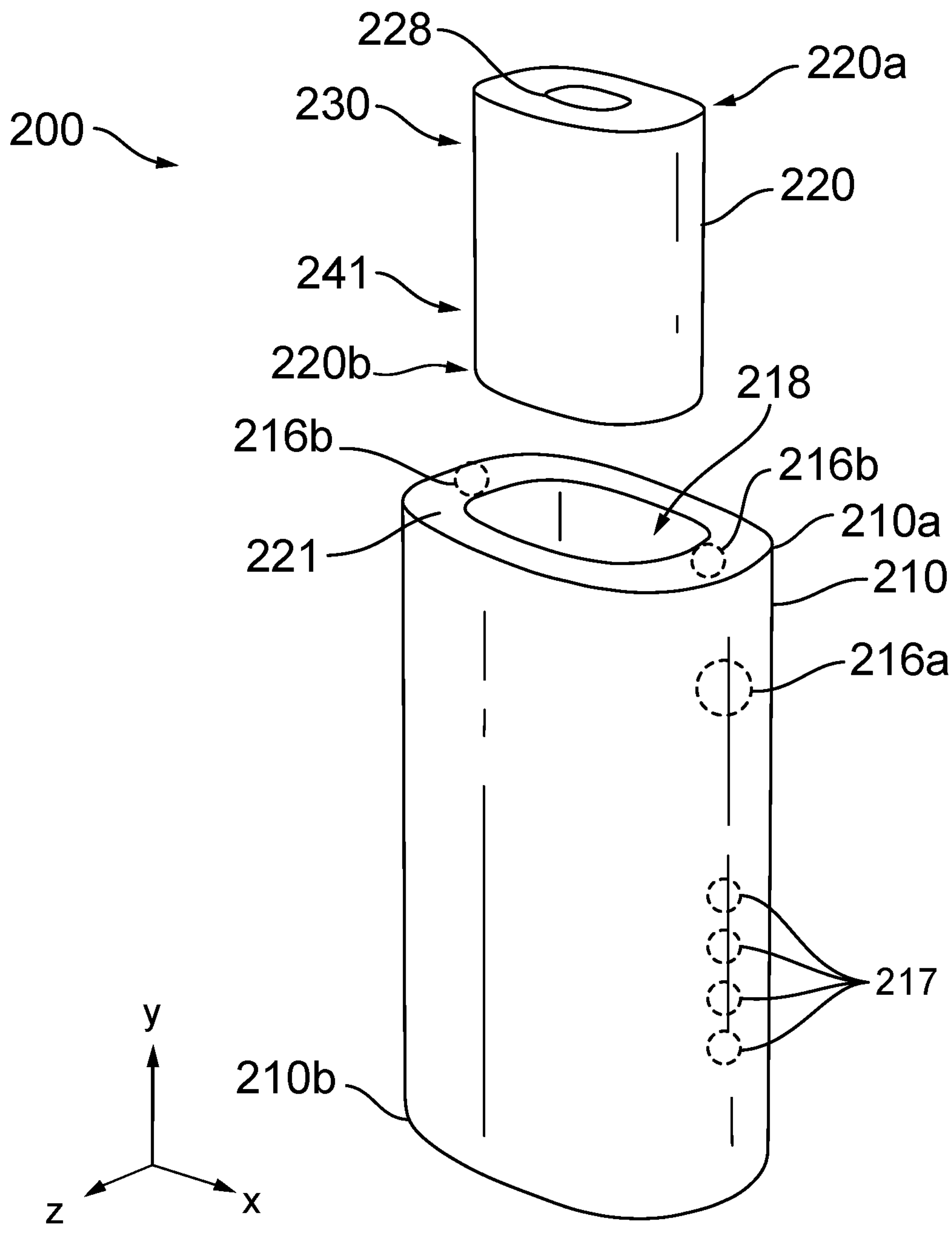

100c
VAPORIZER BODY 110
CONTROLLER 104
COMMUNICATION HARDWARE 105
MEMORY 108
POWER SOURCE 112
INPUT DEVICE(S) 116
SENSOR(S) 113
OUTPUT(S) 117
DRIVING CIRCUITRY 143
LEDGE 121
RECEPTACLE 118
CARTRIDGE 120
SHELL 192
CHANNEL 184
MOUTHPIECE 130
RESERVOIR 182
VAPORIZABLE MATERIAL 102
HEATER 141
HEATING ELEMENT 142

FIG. 1C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220b
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216b
210a
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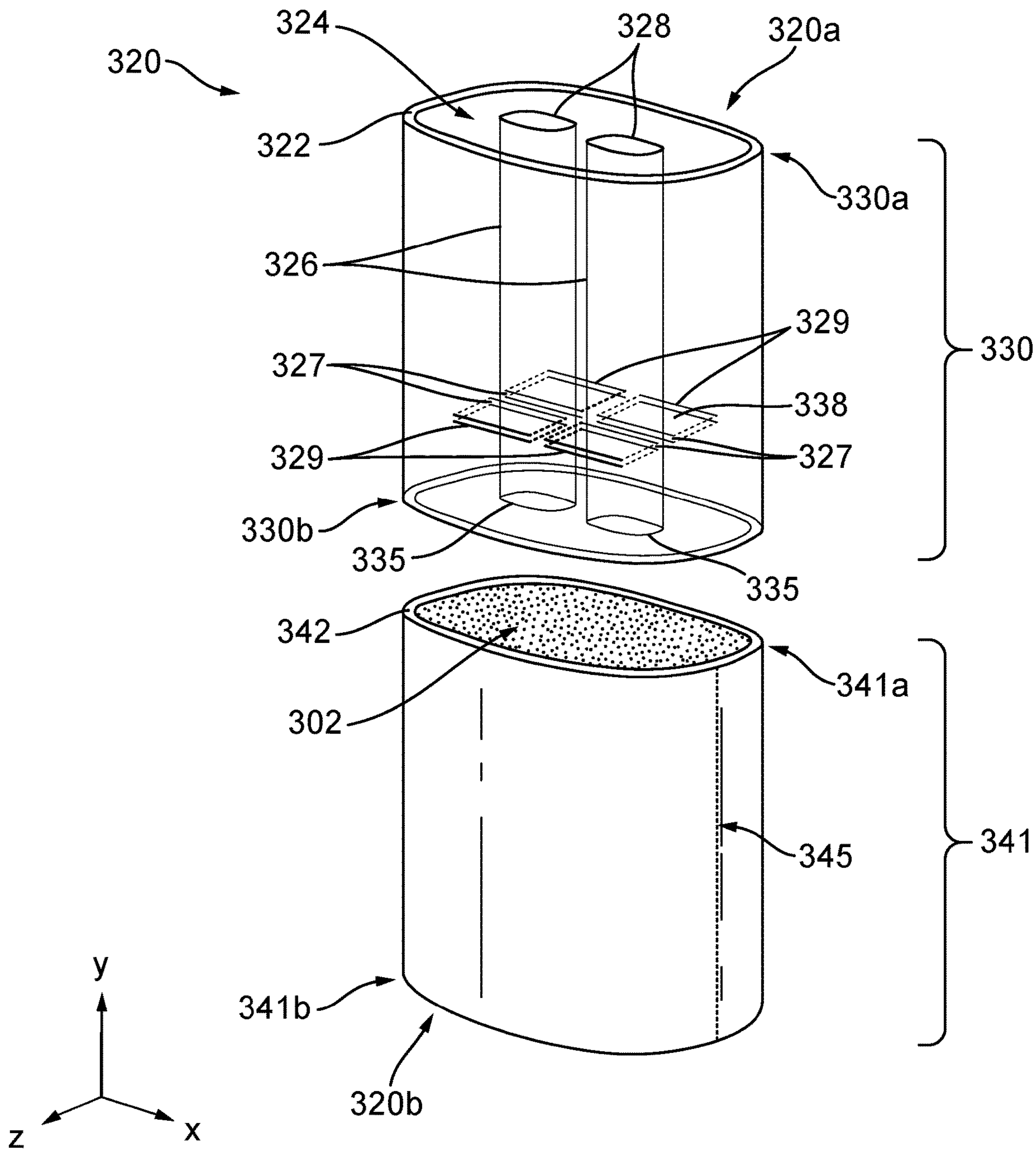
210
216a
217
y
210b
z
x

FIG. 2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330b
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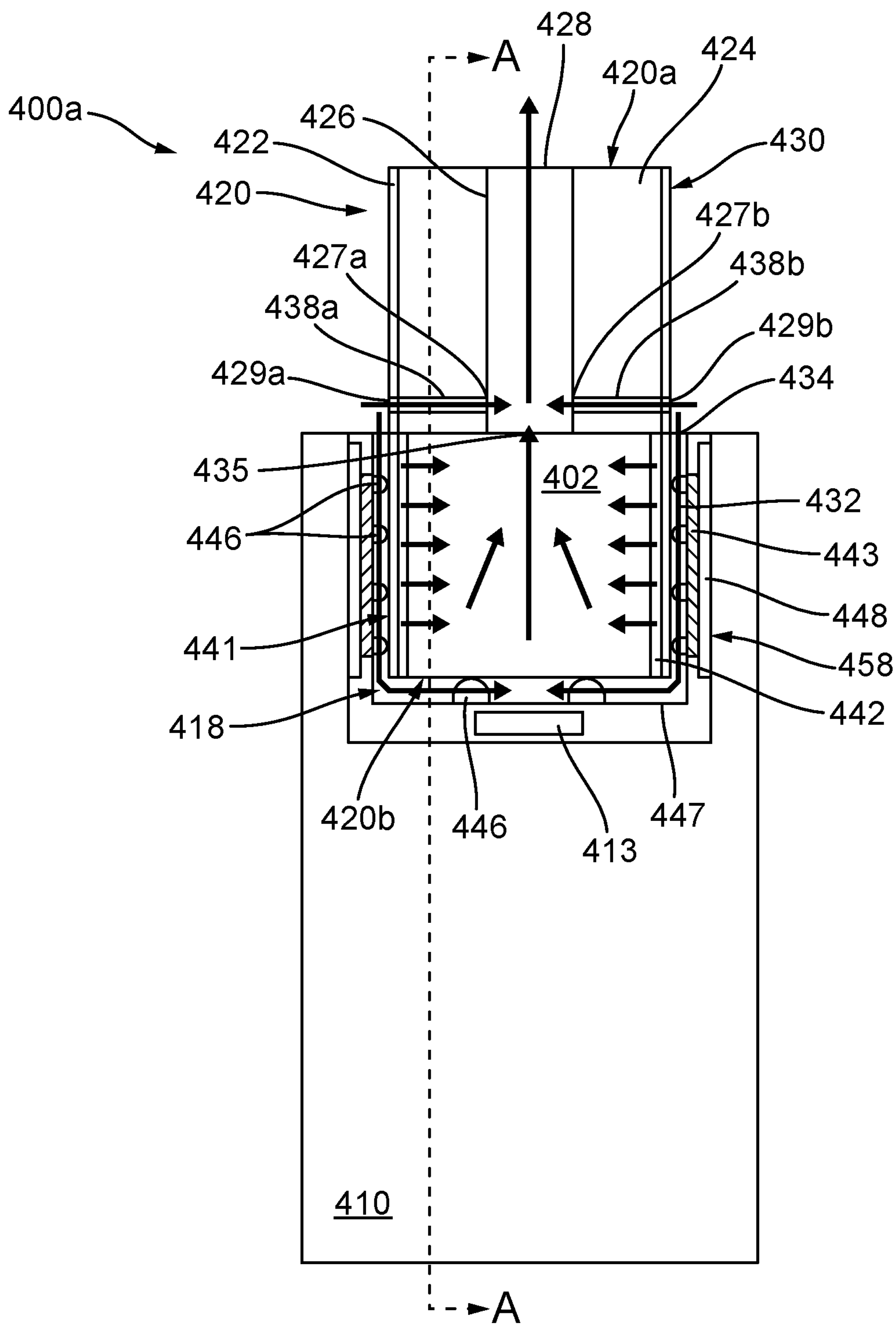
341a
302
341
345
y
341b
320b
z
x

FIG. 3



A
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422
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427b
427a
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438a
429b
429a
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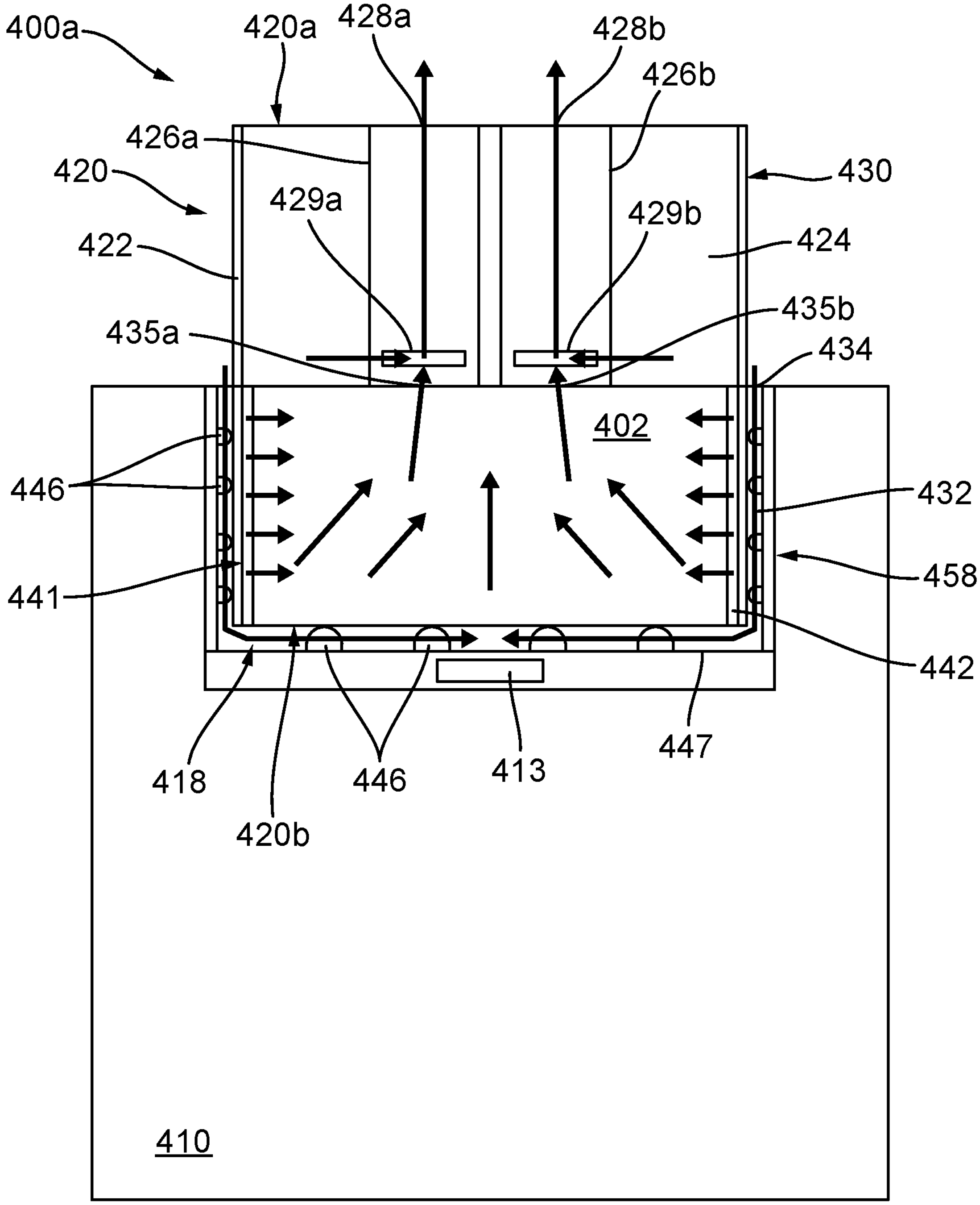
432
446
443
448
441
458
442
418
420b
446
413
447
410
A

FIG. 4A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426b
426a
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420
429a
429b
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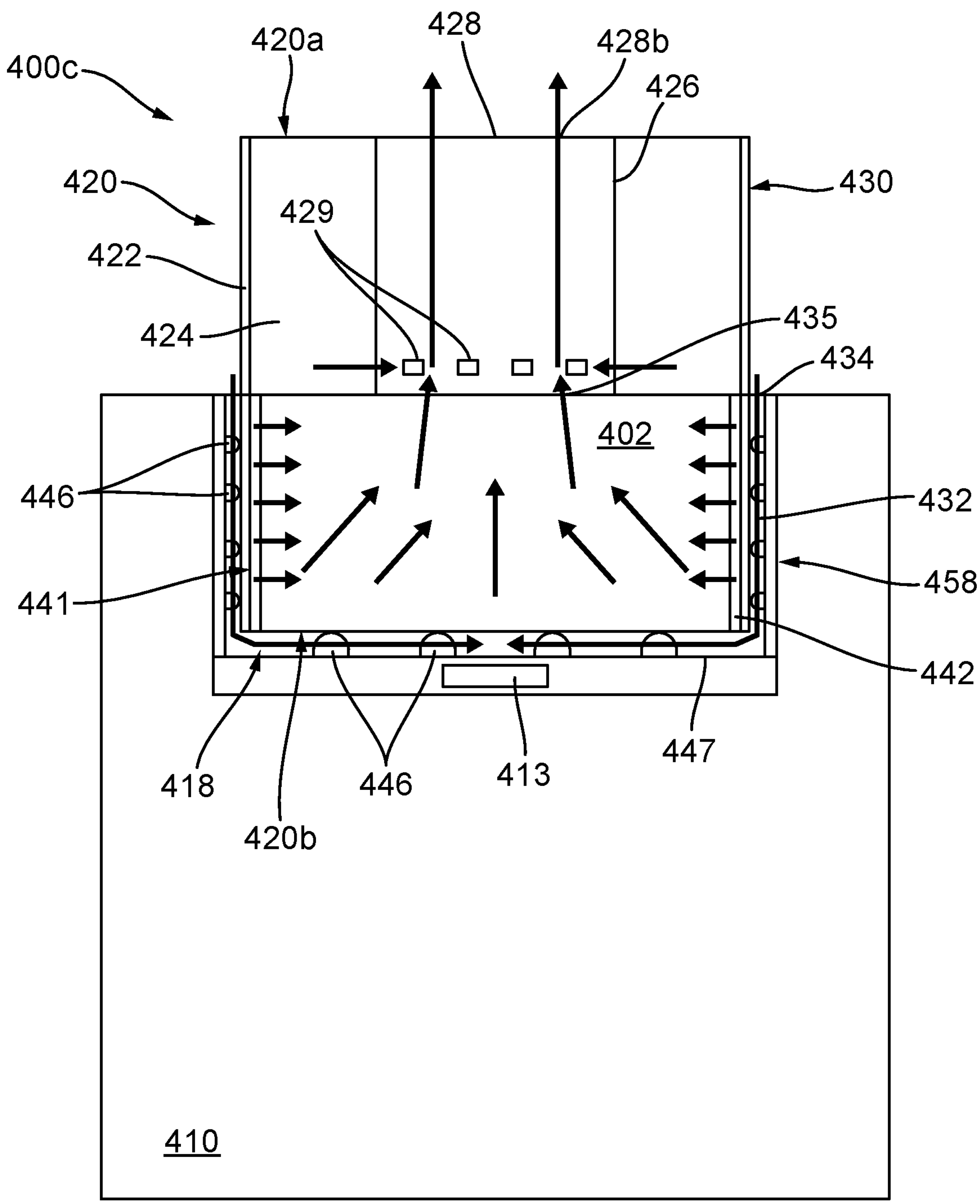
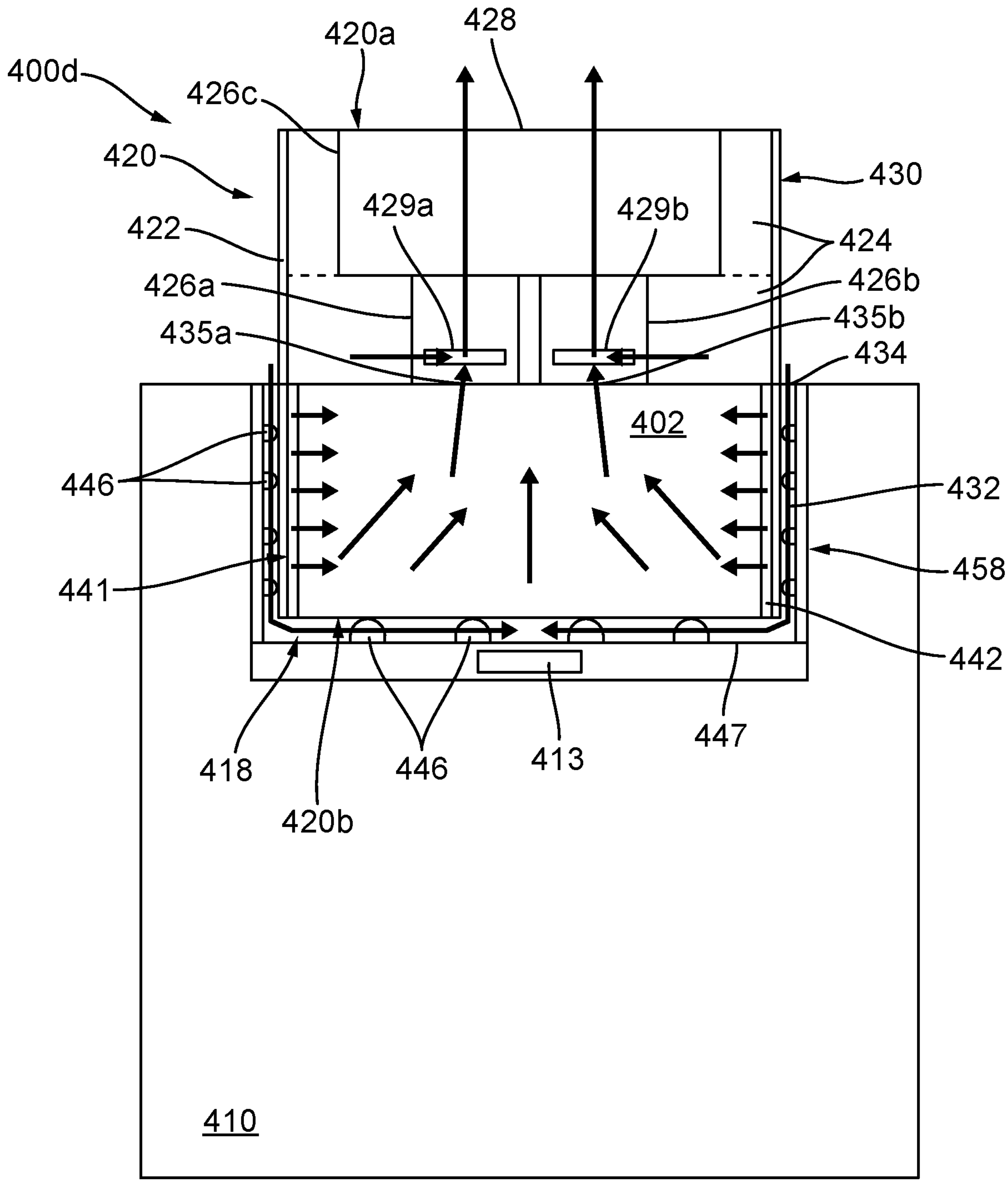
422
435b
435a
434
402
446
432
458
441
442
418
420b
446
413
447
410

FIG. 4B



400c
420a
428
428b
426
420
430
429
422
424
435
434
402
446
432
458
441
442
418
420b
446
413
447
410

FIG. 4C


400d
420a
428
426c
420
430
429a
429b
422
424
426a
426b
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435b
434
402
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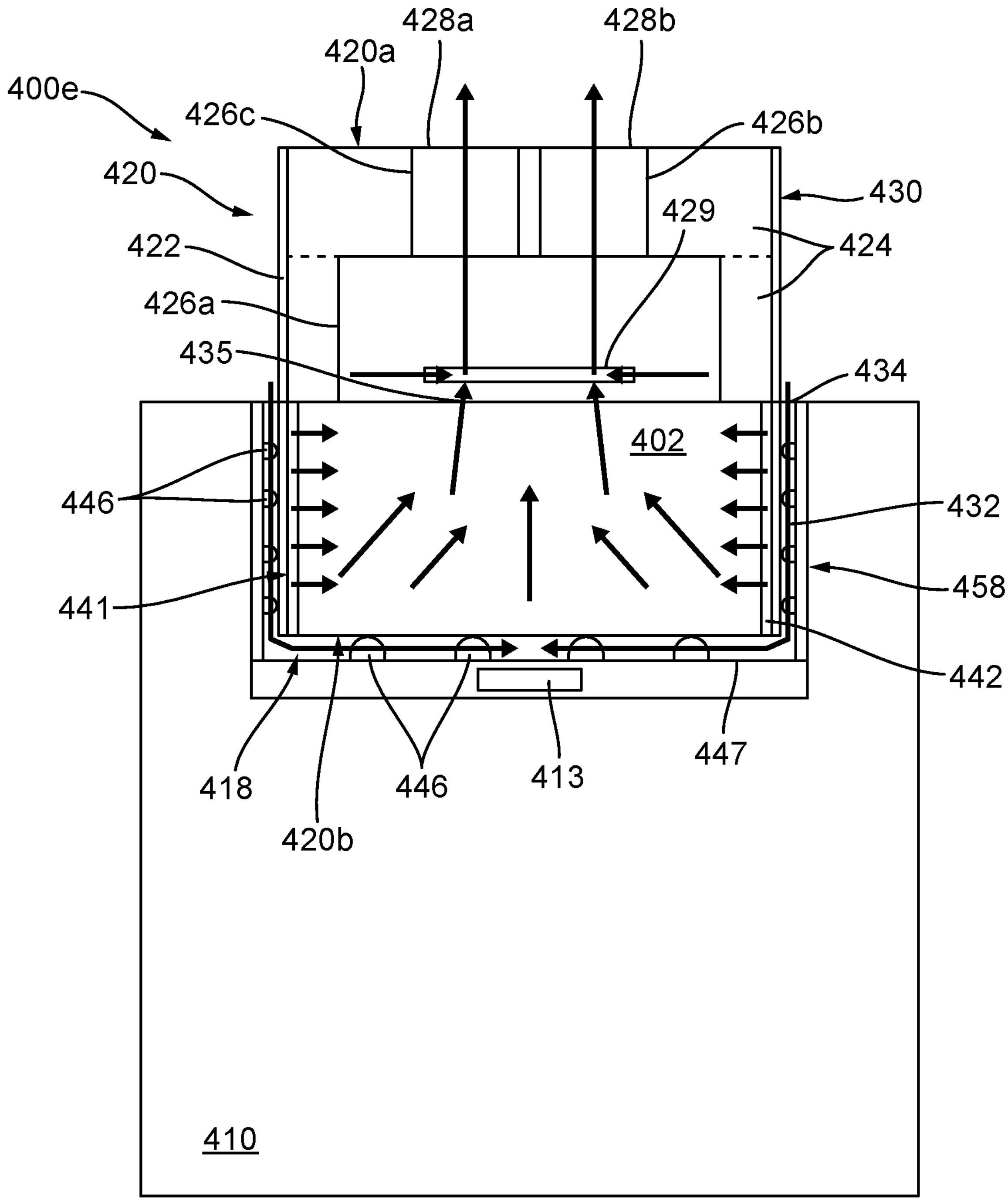
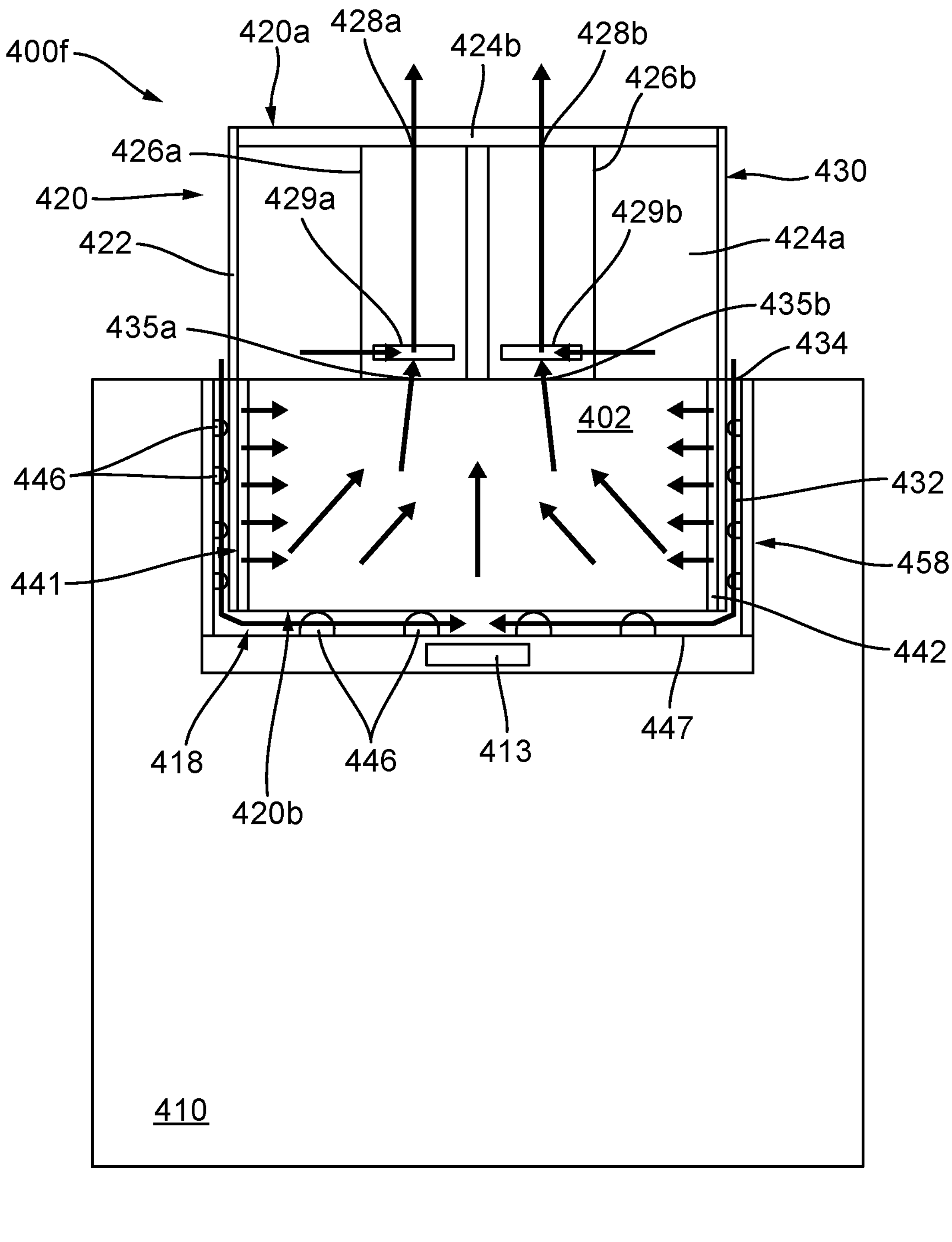
432
458
441
442
418
420b
446
413
447
410

FIG. 4D



400e
420
420a
428a
428b
426c
426b
430
429
424
422
426a
435
434
402
446
432
458
441
442
418
420b
446
413
447
410

FIG. 4E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428b
426b
426a
430
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429a
429b
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424a
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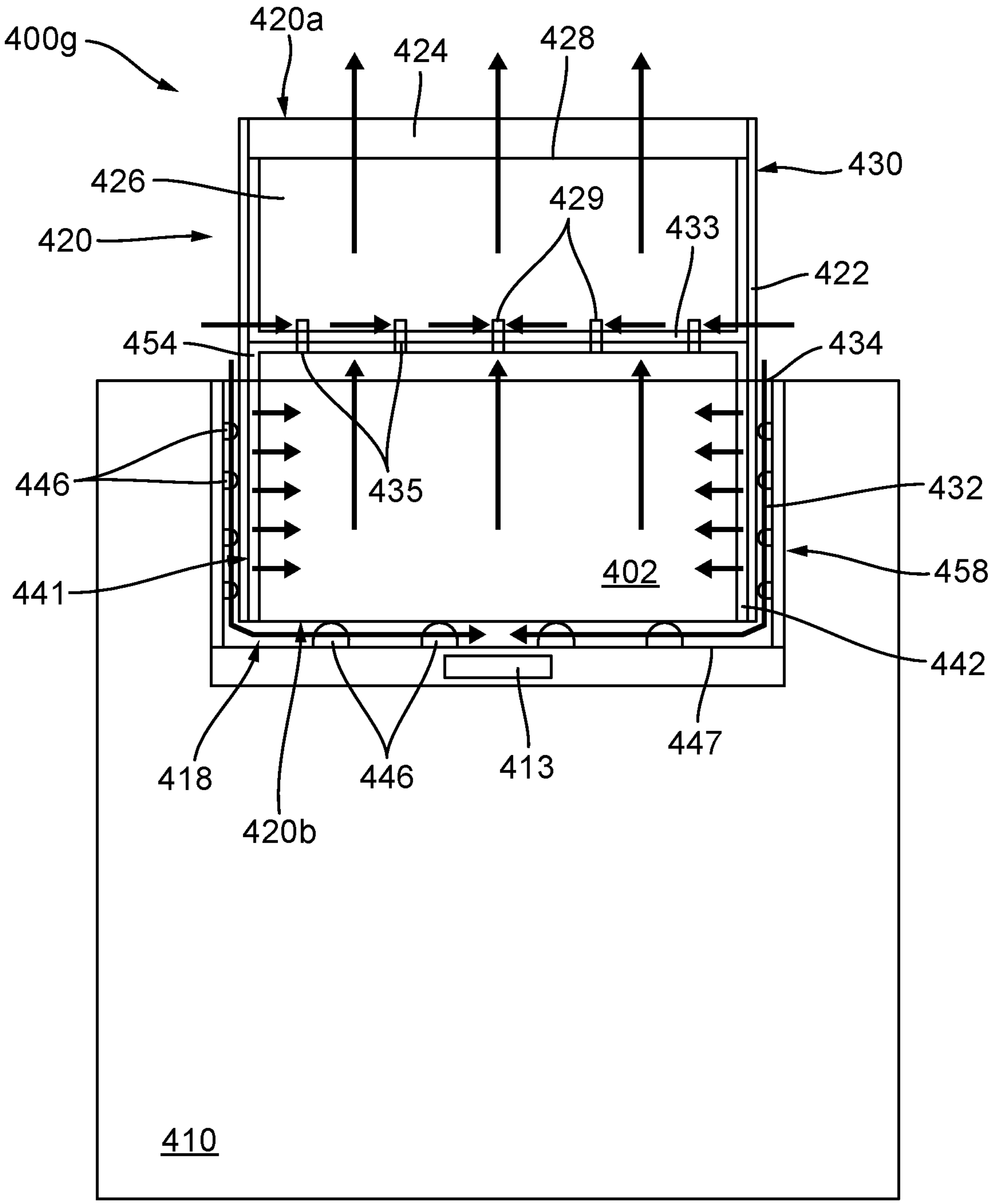
435a
434
402
446
432
458
441
442
418
420b
446
413
447
410

FIG. 4F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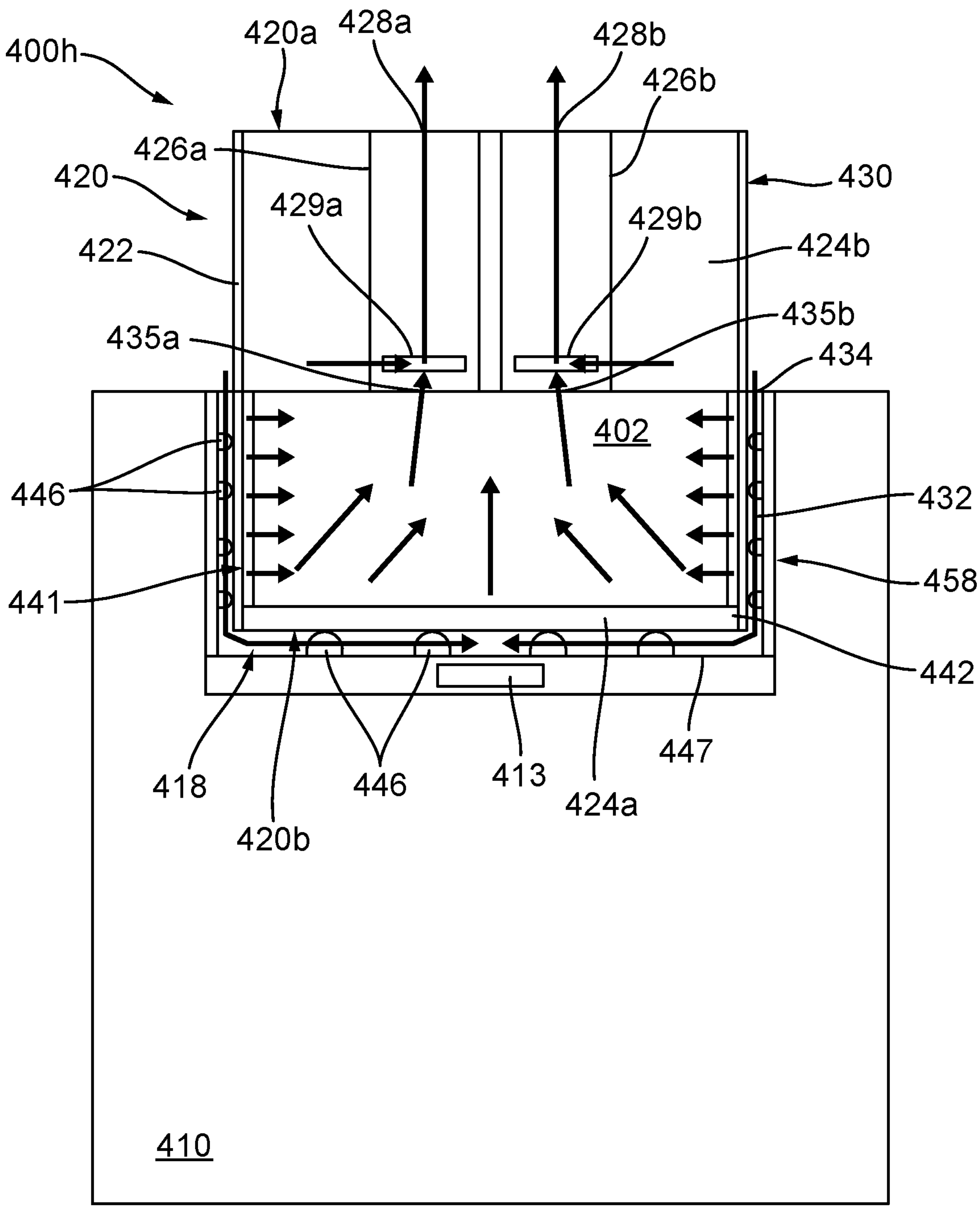
424
428
426
430
420
429
433
422
454
434
446
435
432
441
402
458
442
418
420b
446
413
447
410

FIG. 4G


400h
420a
428a
428b
426b
426a
420
430
429a
429b
422
424b
435b
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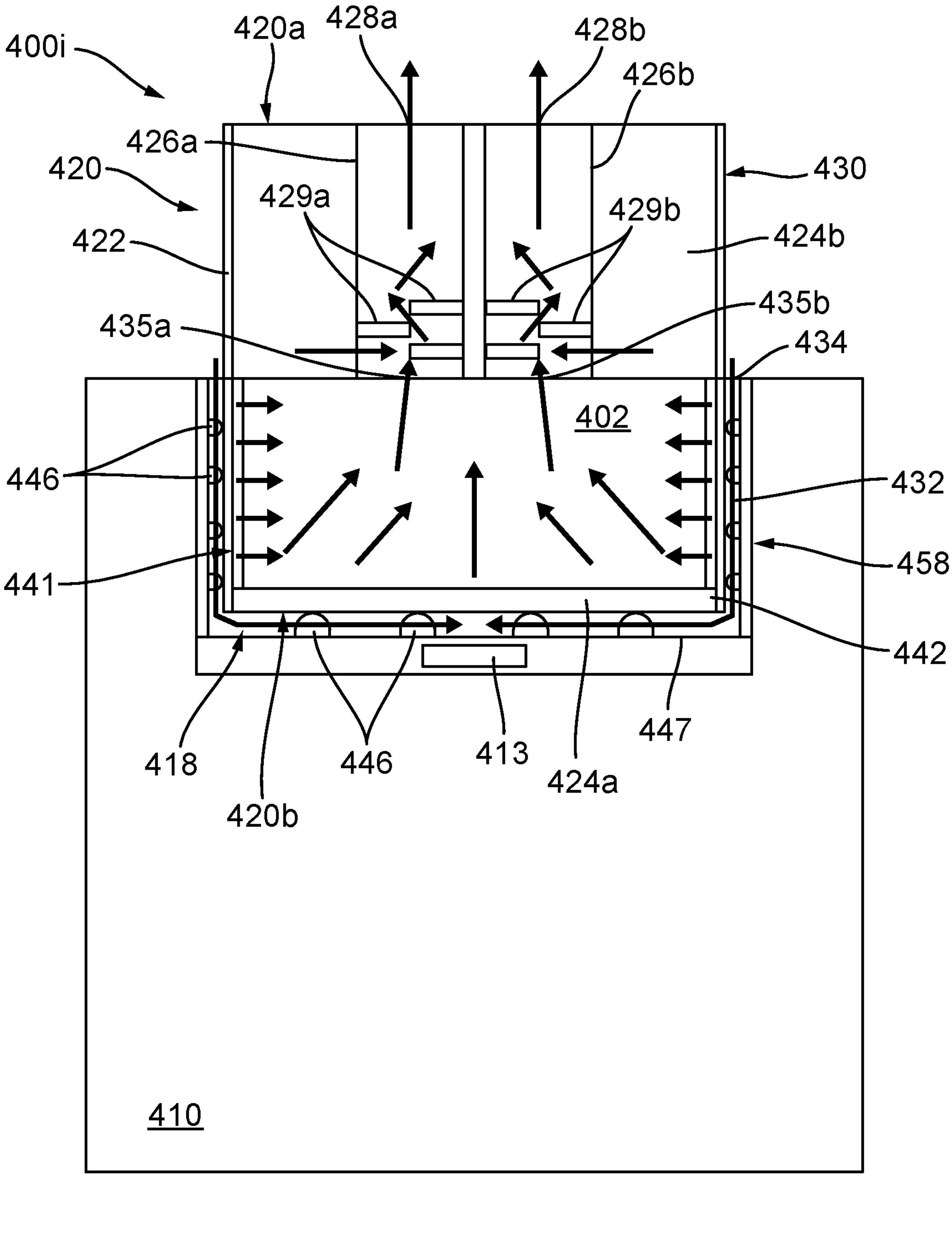
434
402
446
432
458
441
442
418
420b
446
413
424a
447
410

FIG. 4H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420a
428a
428b
426b
426a
420
430
429a
429b
422
424b
435b
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432
458
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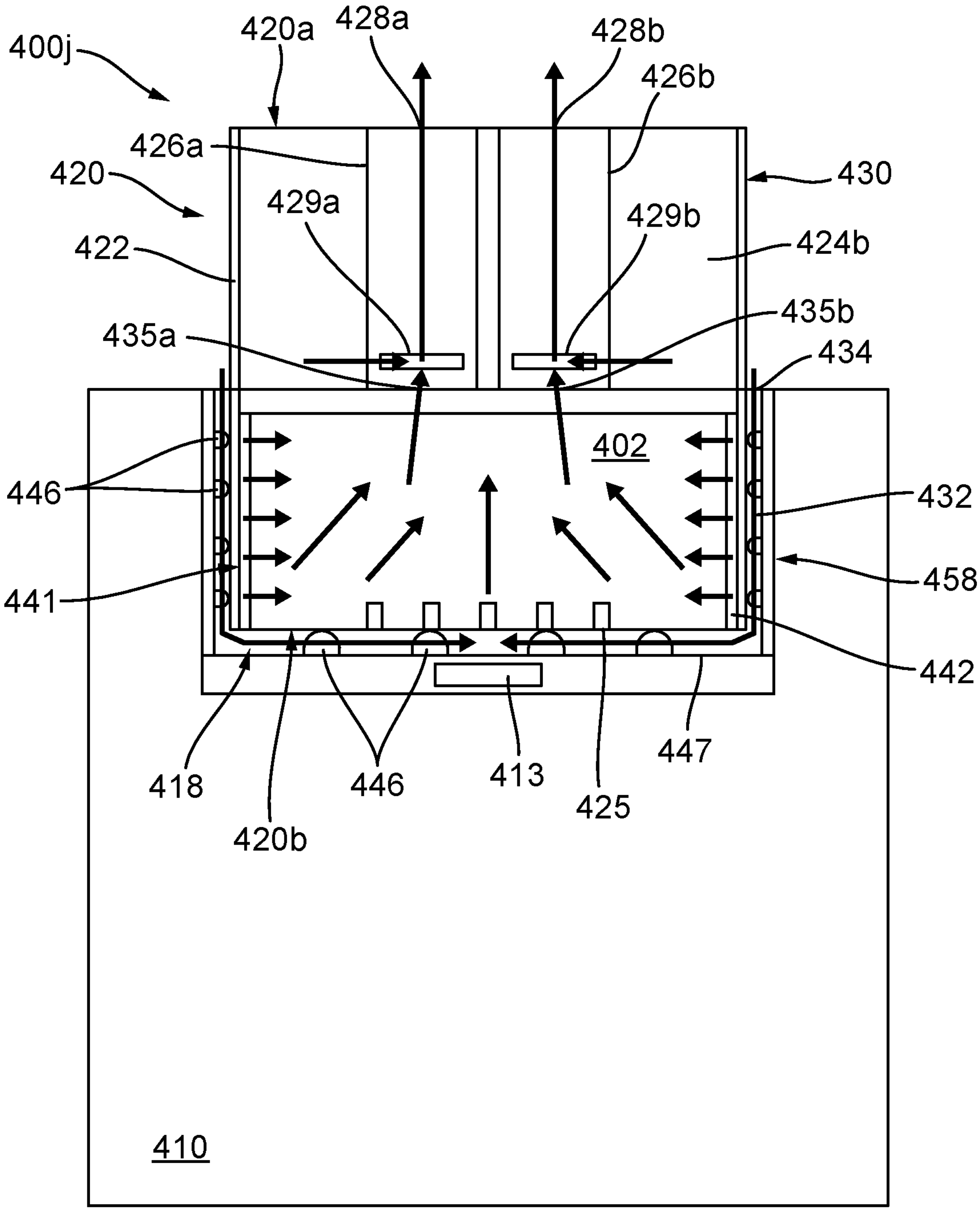
420b
446
413
424a
447
410

FIG. 4I


400j
420a
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428b
426b
426a
430
420
429a
429b
422
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435b
435a
434
402
446
432
458
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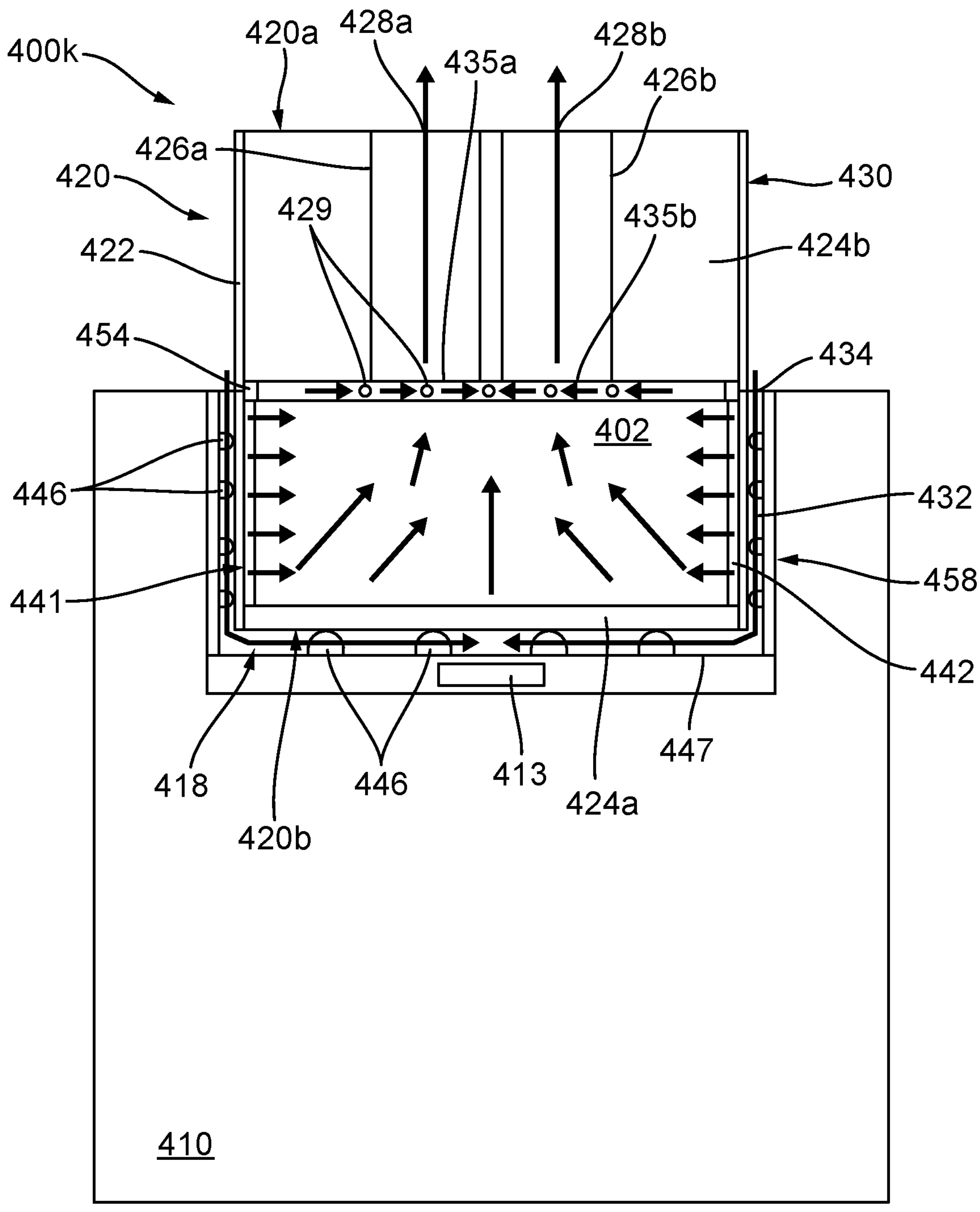
442
418
420b
446
413
425
447
410

FIG. 4J


400k
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428a
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426b
426a
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435b
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424b
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458
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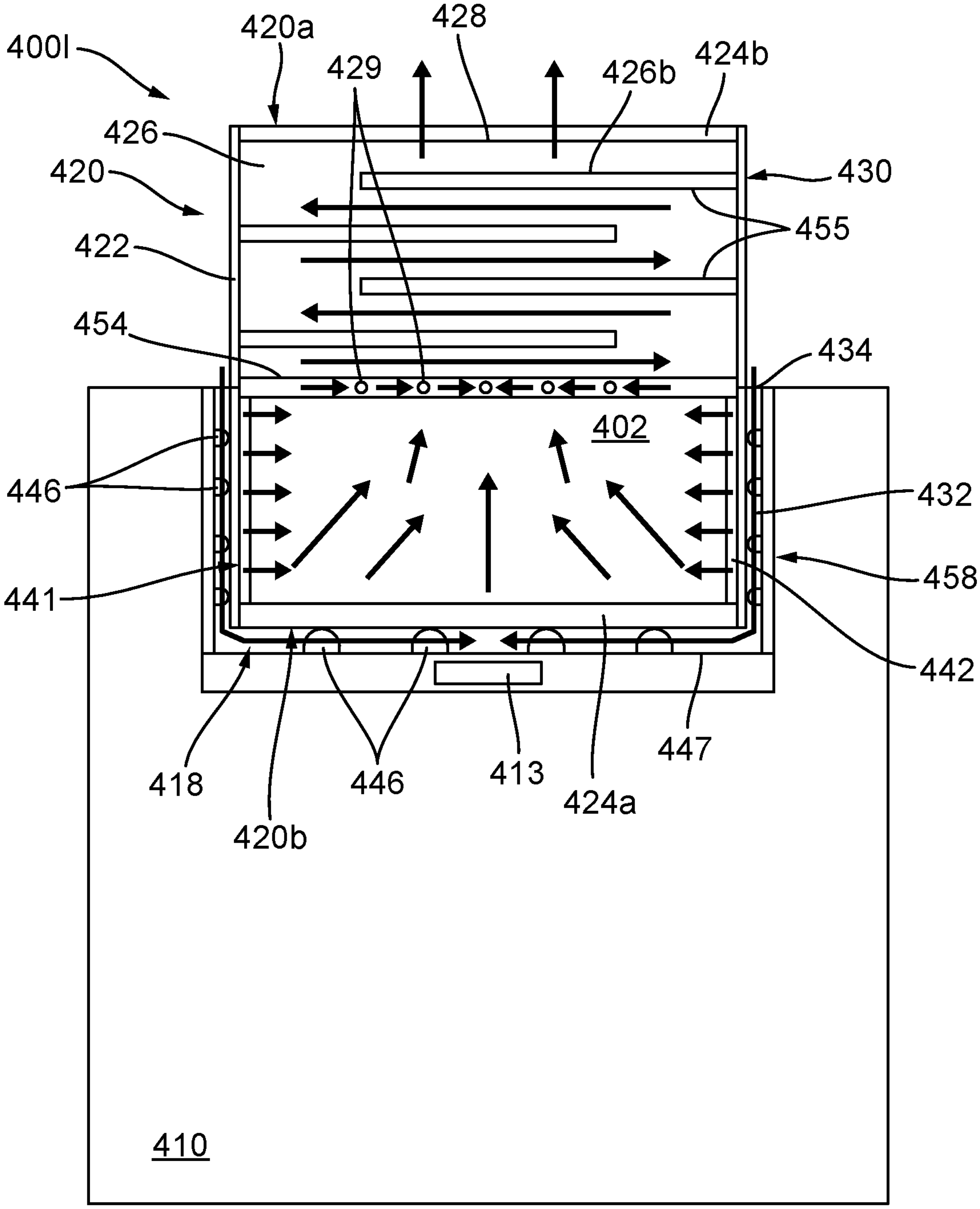
420b
446
413
424a
447
410

FIG. 4K



400l
420a
428
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426b
424b
426
420
430
455
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434
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446
432
458
441
442
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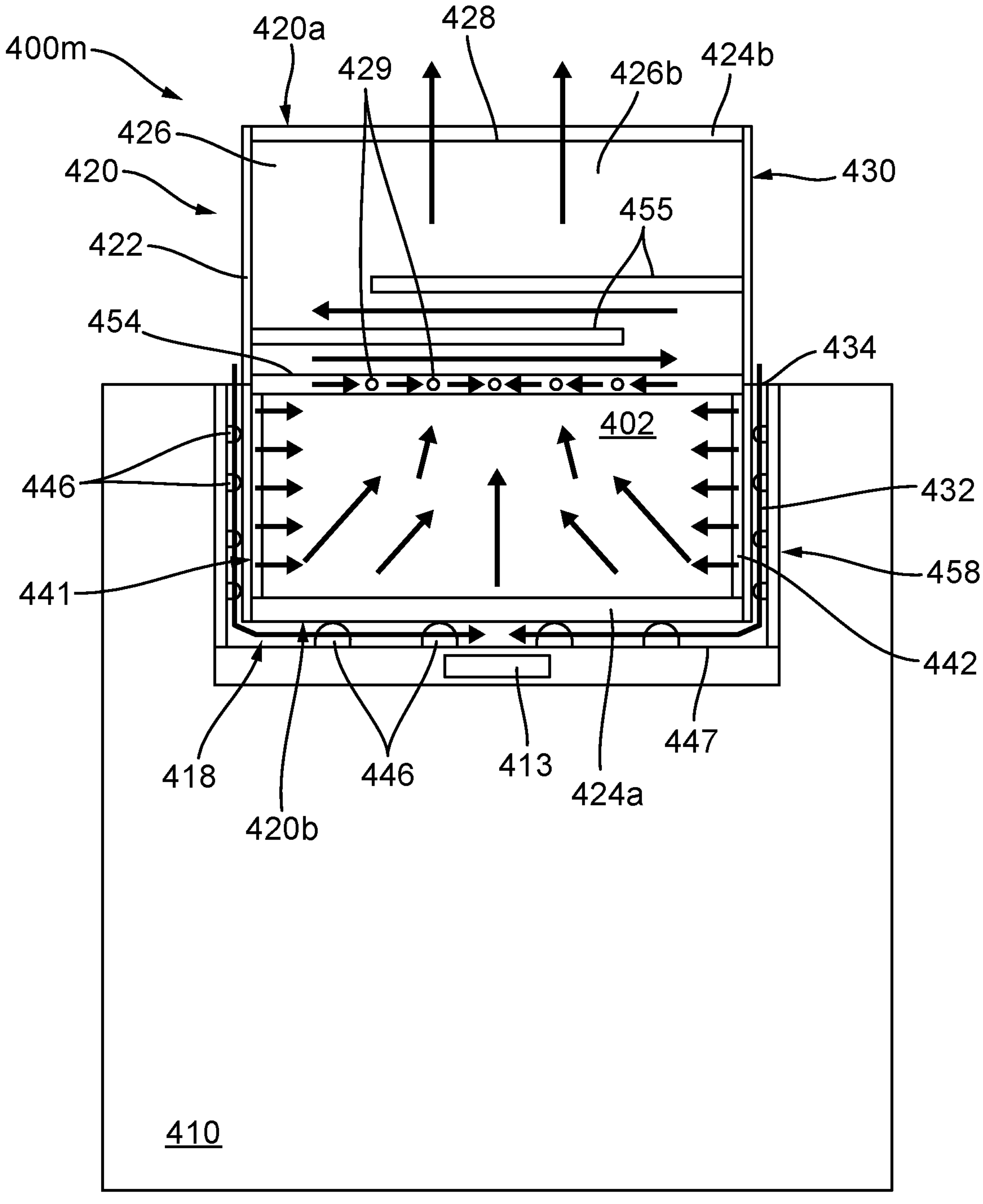
420b
446
413
447
424a
410

FIG. 4L


400m
420a
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424a
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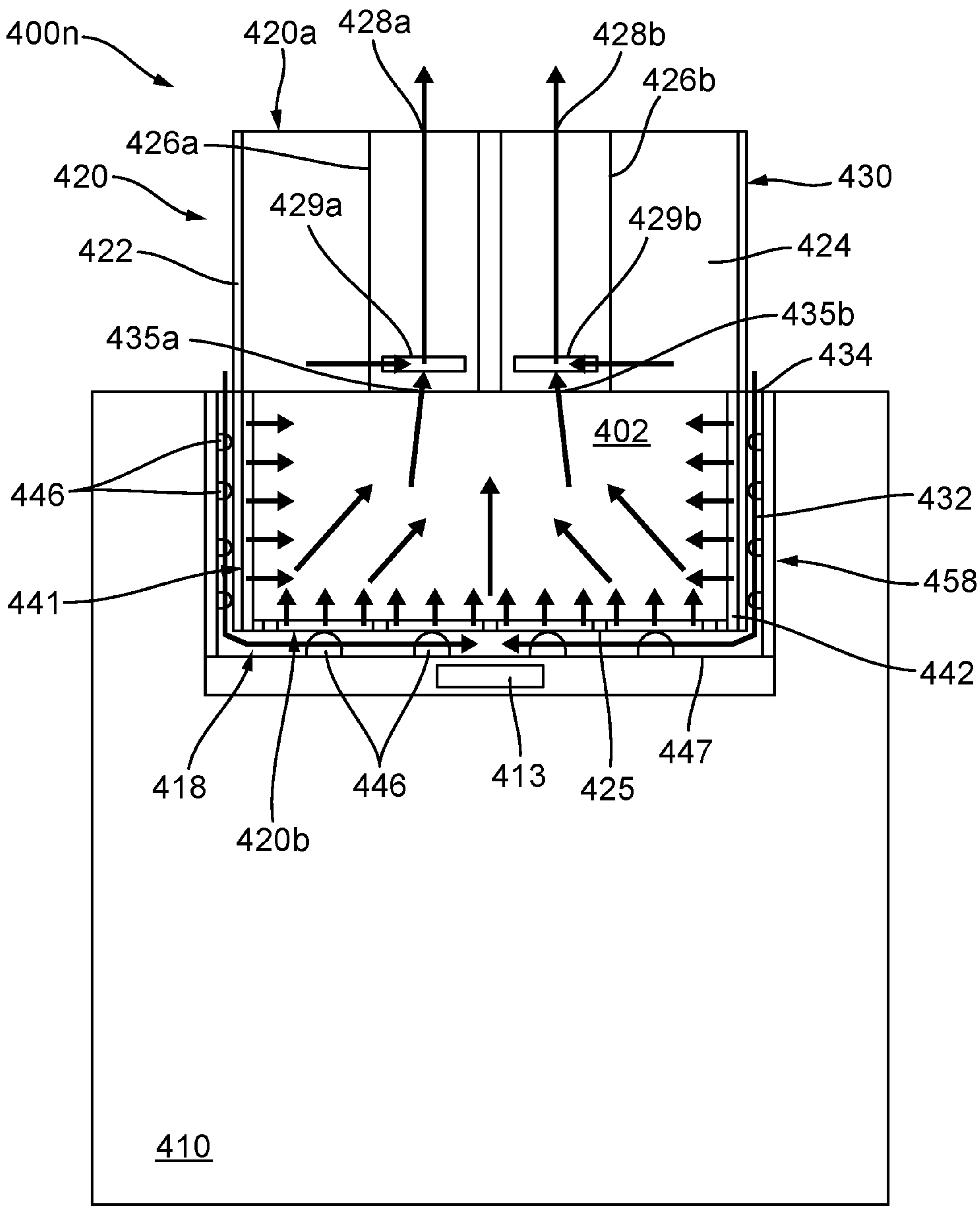
410

FIG. 4M


400n
420a
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432
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420b
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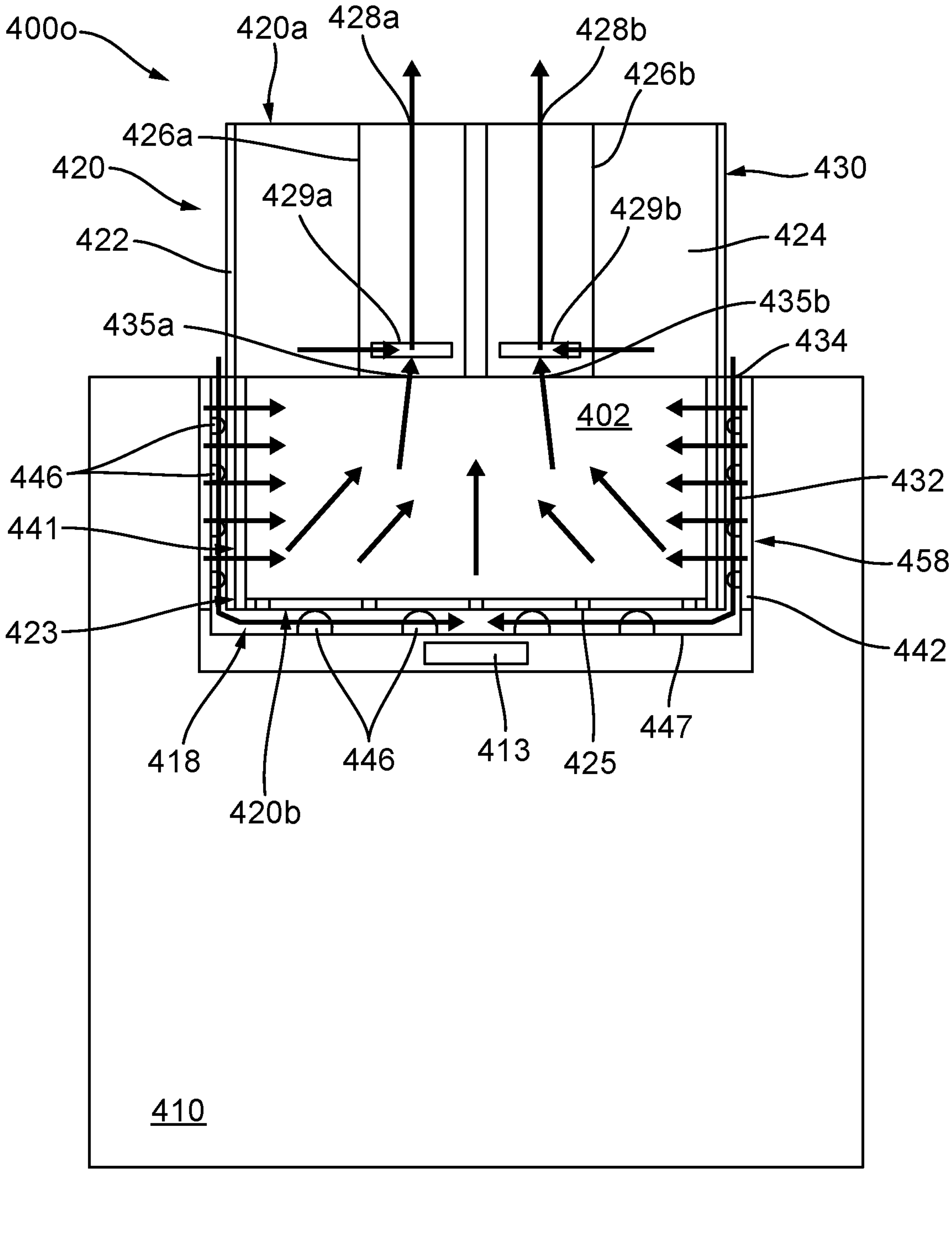
413
425
447
410

FIG. 4N


400o
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428a
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426b
426a
420
430
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429b
422
424
435b
435a
434
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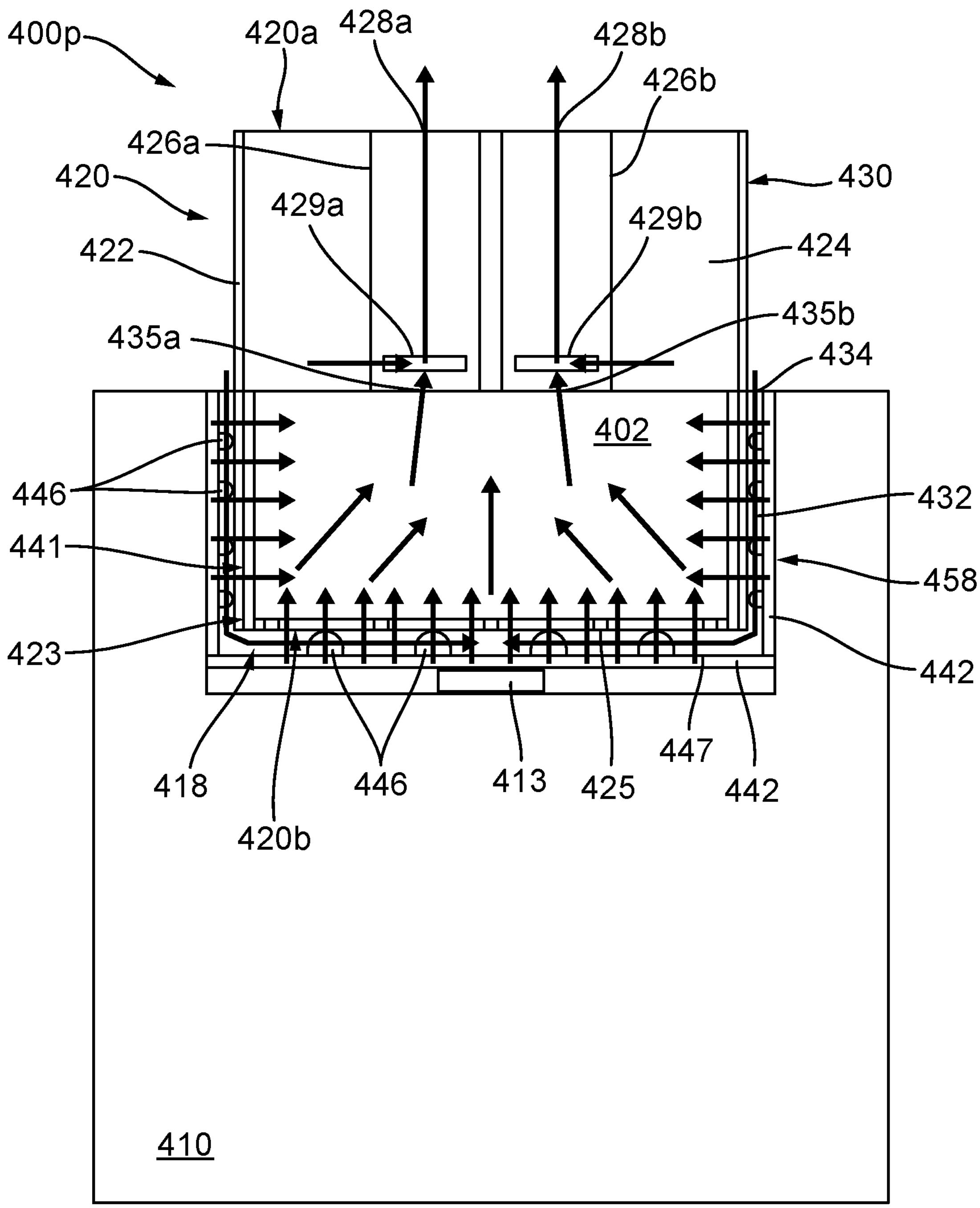
432
441
458
423
442
418
420b
446
413
425
447
410

FIG. 4O


400p
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428a
428b
426b
426a
420
430
429a
429b
422
424
435b
435a
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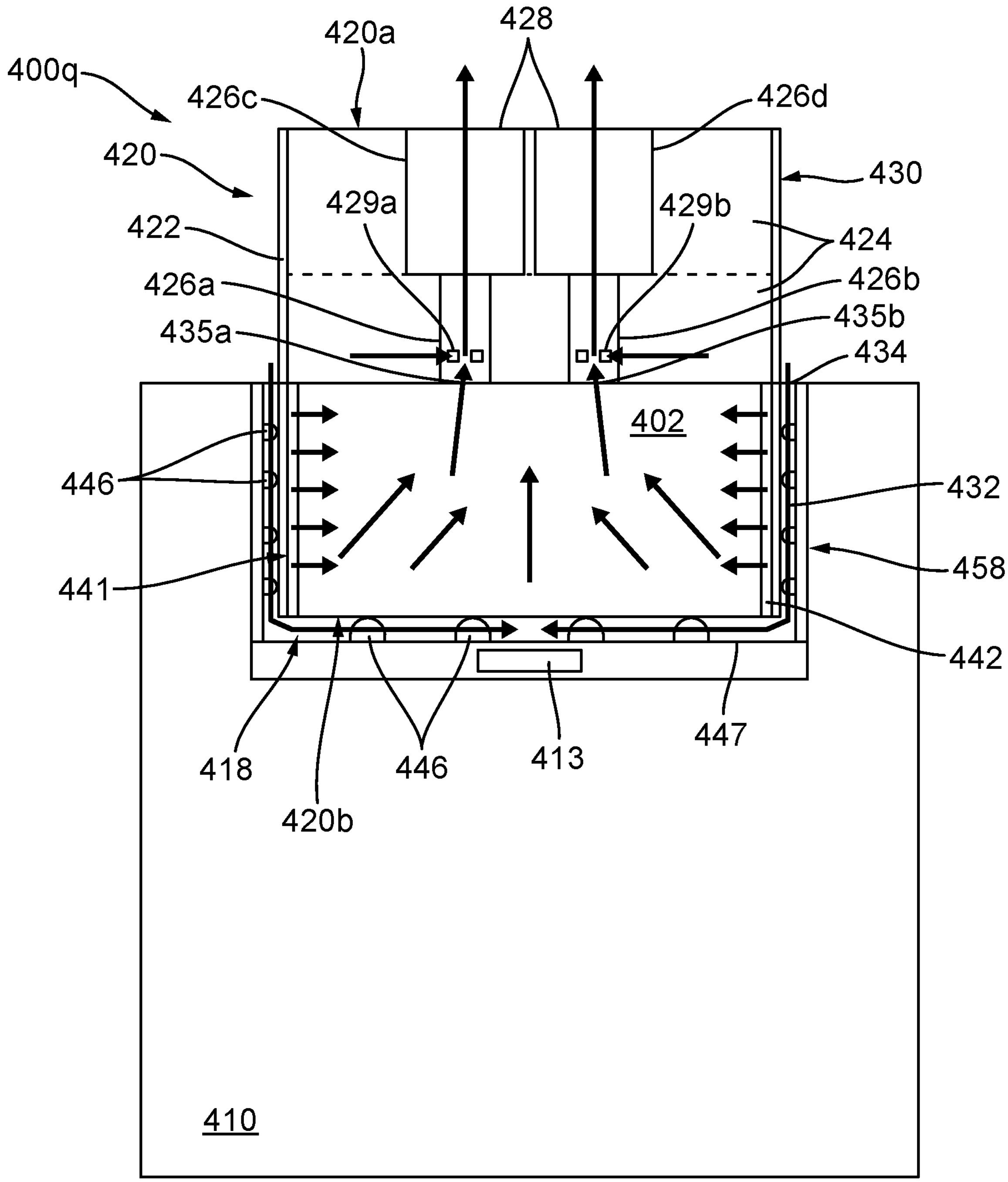
402
446
432
441
458
423
442
418
420b
446
413
425
447
442
410

FIG. 4P


400q
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428
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420
430
429a
429b
422
424
426a
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420b
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447
410

FIG. 4Q

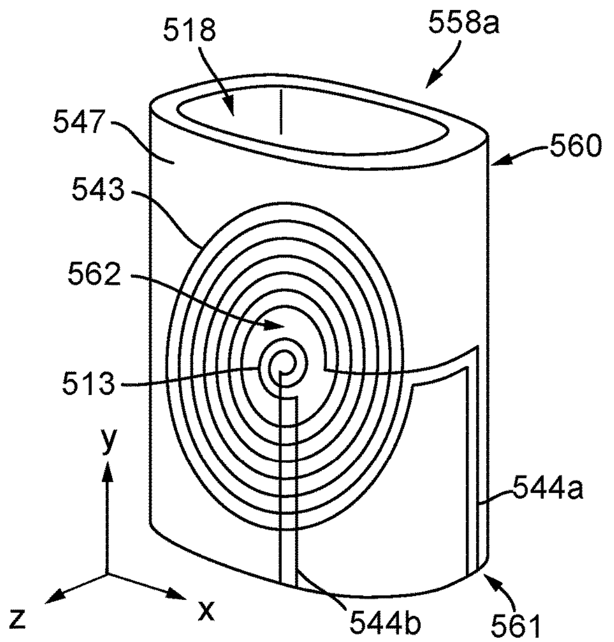


FIG. 5A

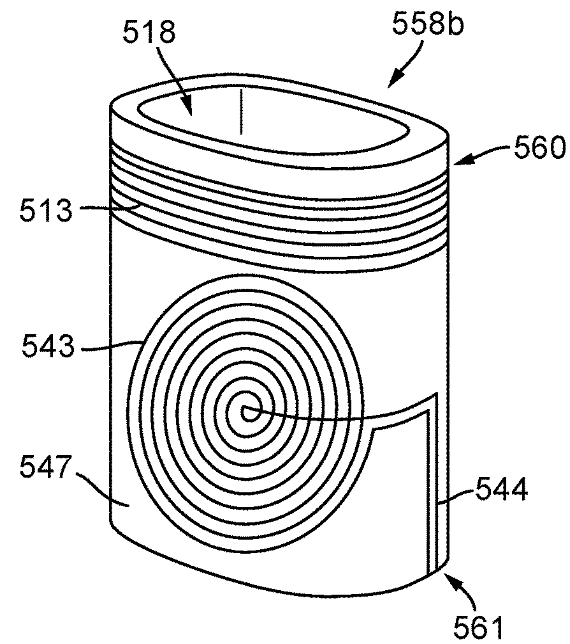


FIG. 5B

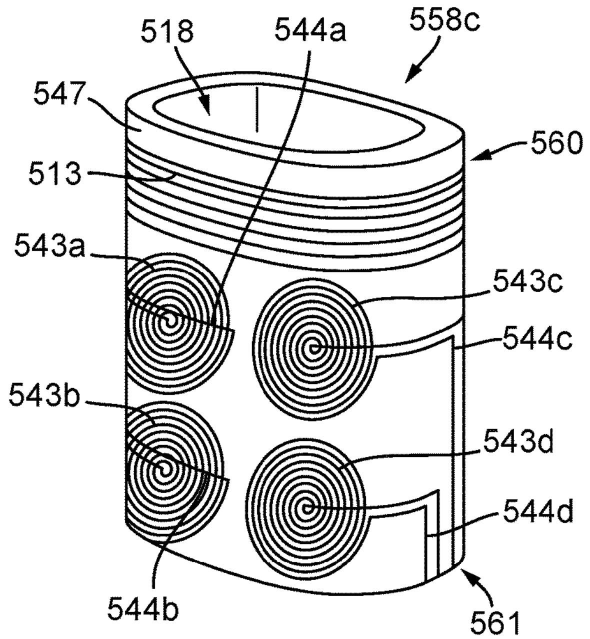


FIG. 5C

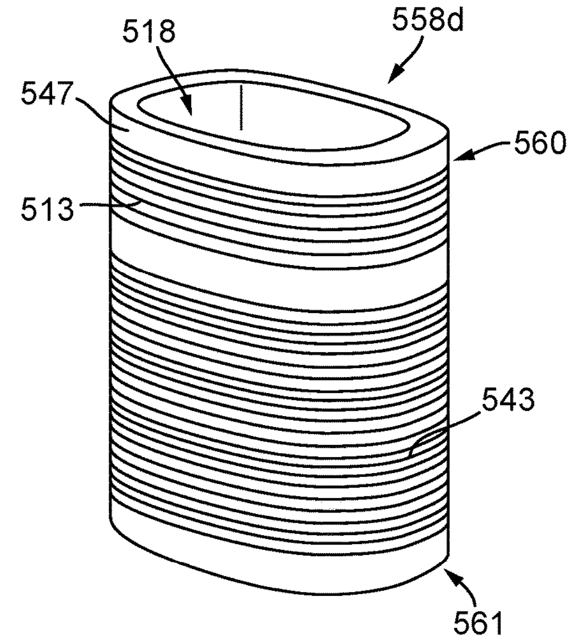


FIG. 5D

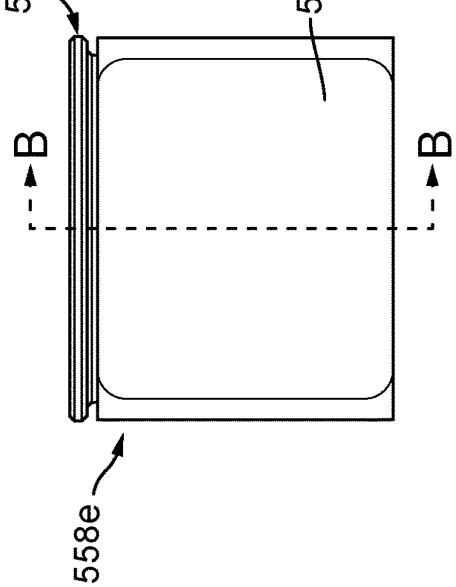


FIG. 5F

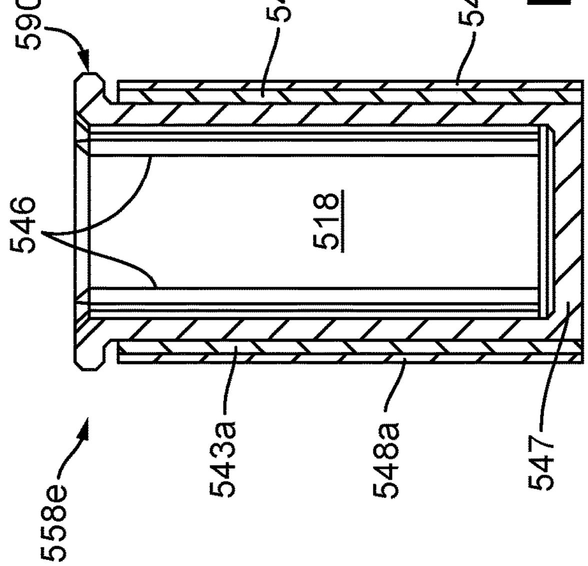


FIG. 5G

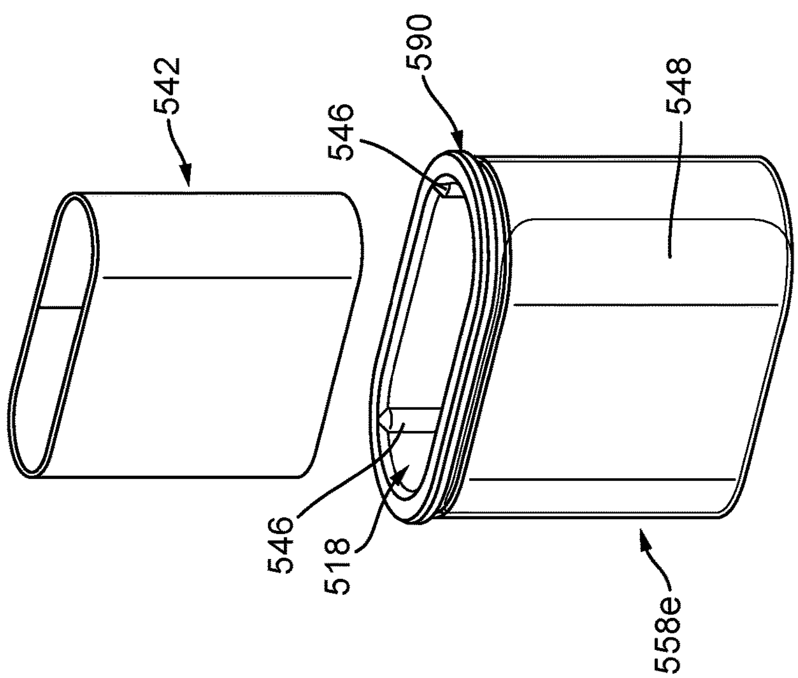


FIG. 5E

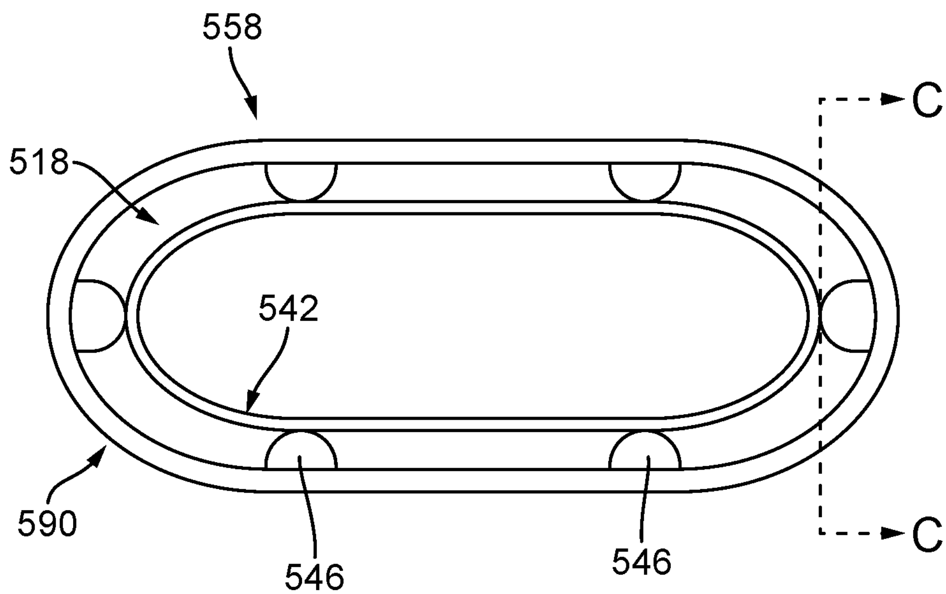


FIG. 5H

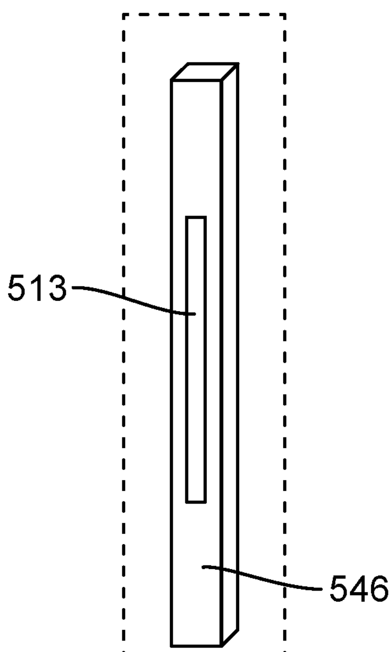


FIG. 5I

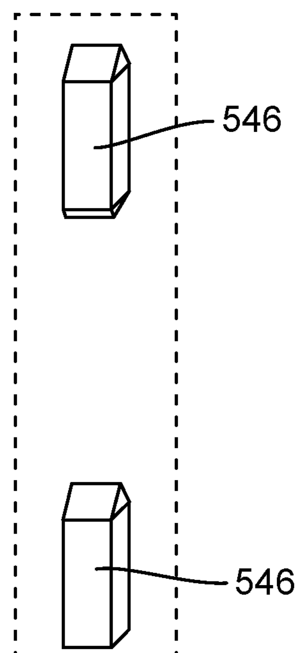
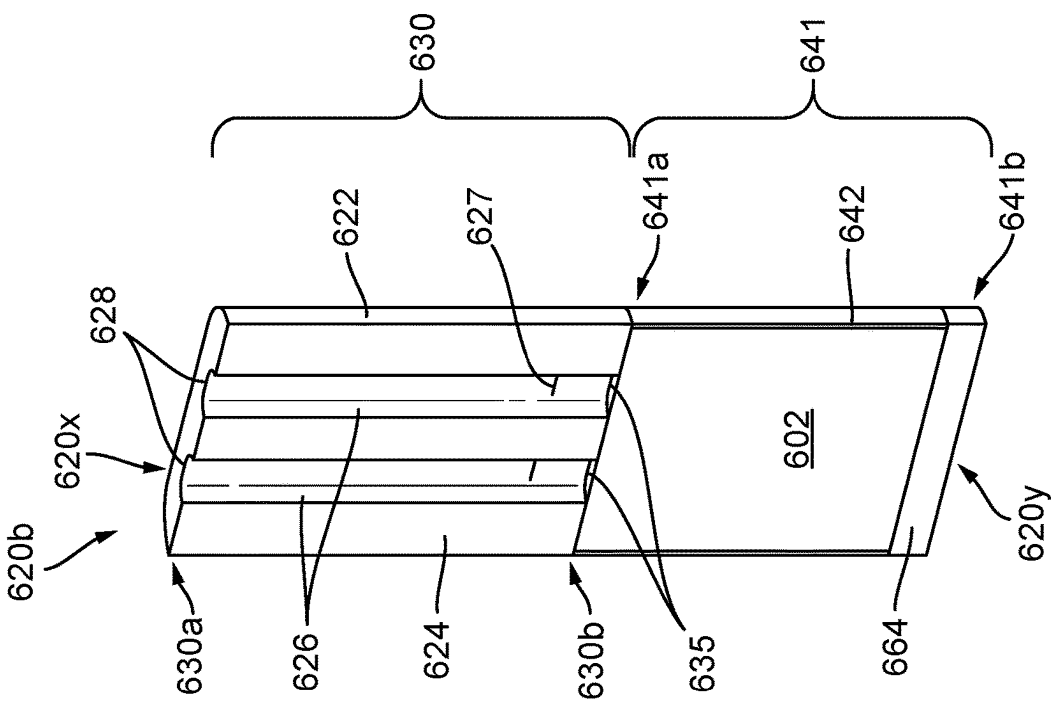


FIG. 5J


630
641
641a
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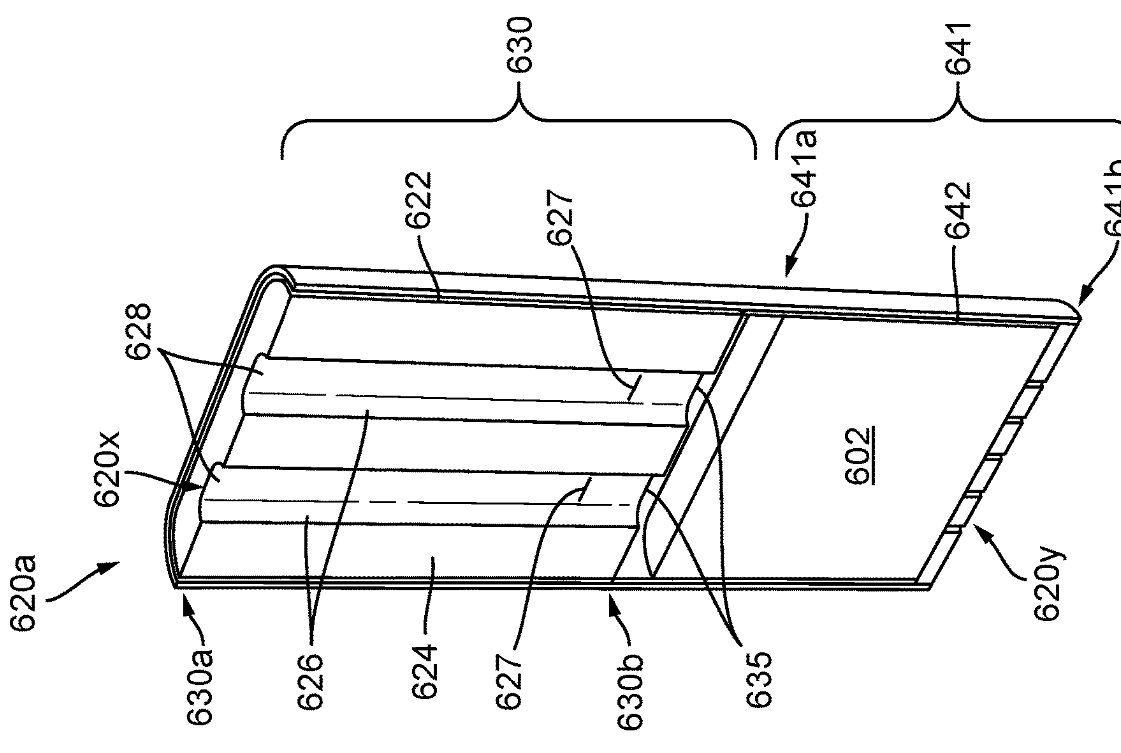
627
642
628
620x
620b
602
620y
630a
626
624
630b
635
664

FIG. 6B


630
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641b
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642
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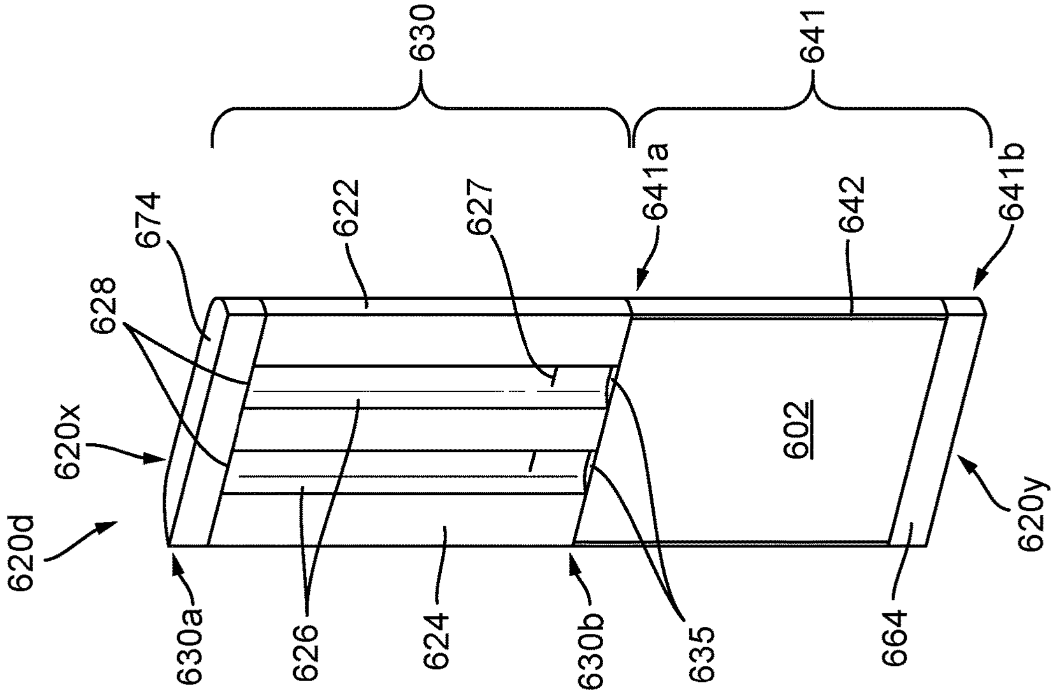
620x
620a
602
620y
630a
626
624
627
630b
635

FIG. 6A


630
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620d
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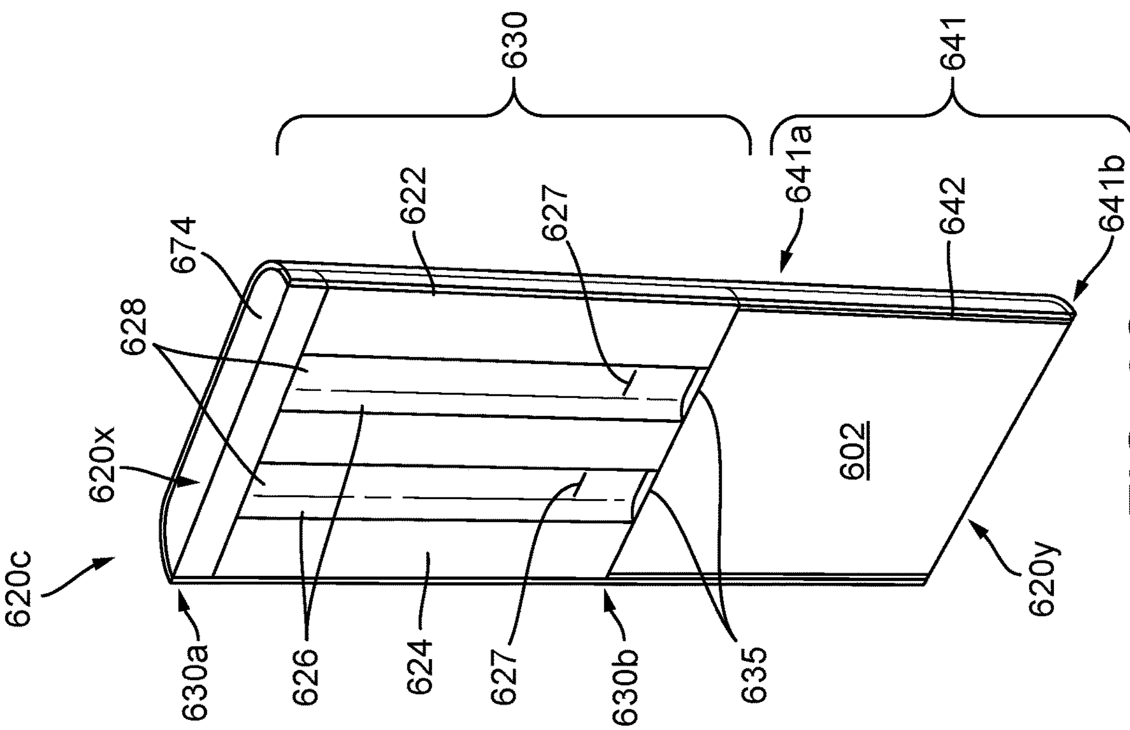
664

FIG. 6D


630
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620c
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641a
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630a
626
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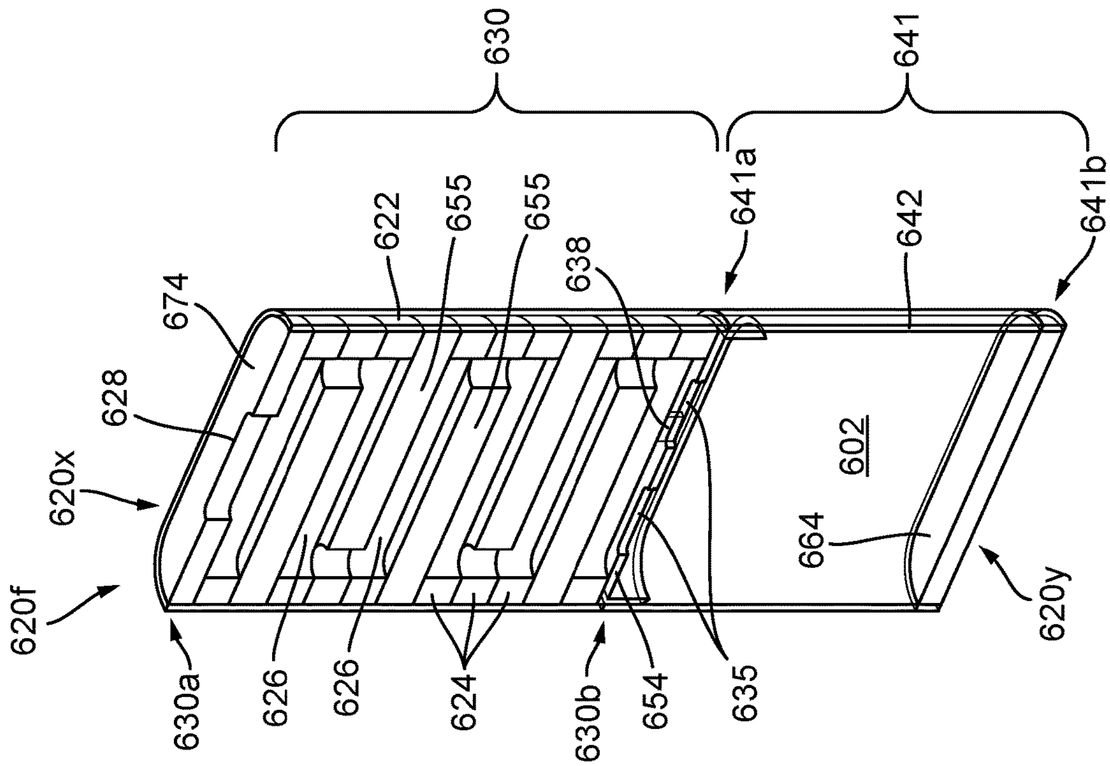
627
630b
635

FIG. 6C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622
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641a
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641b
602
664
620y
630a
626
626
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630b
654
635

FIG. 6F

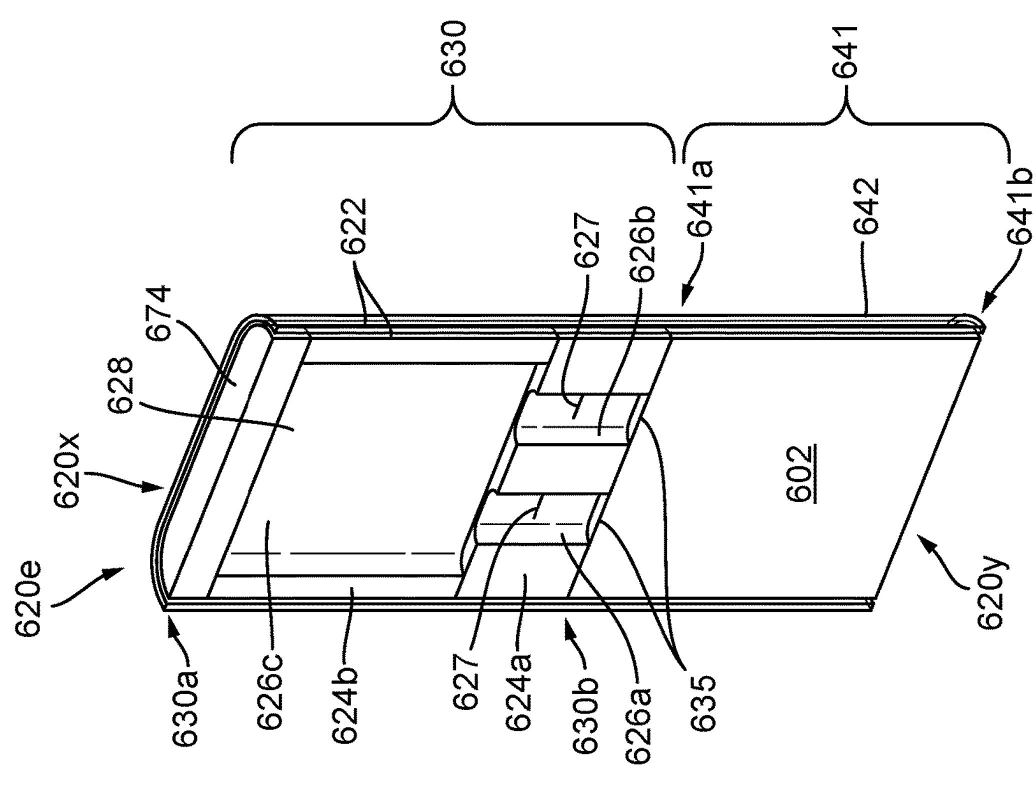
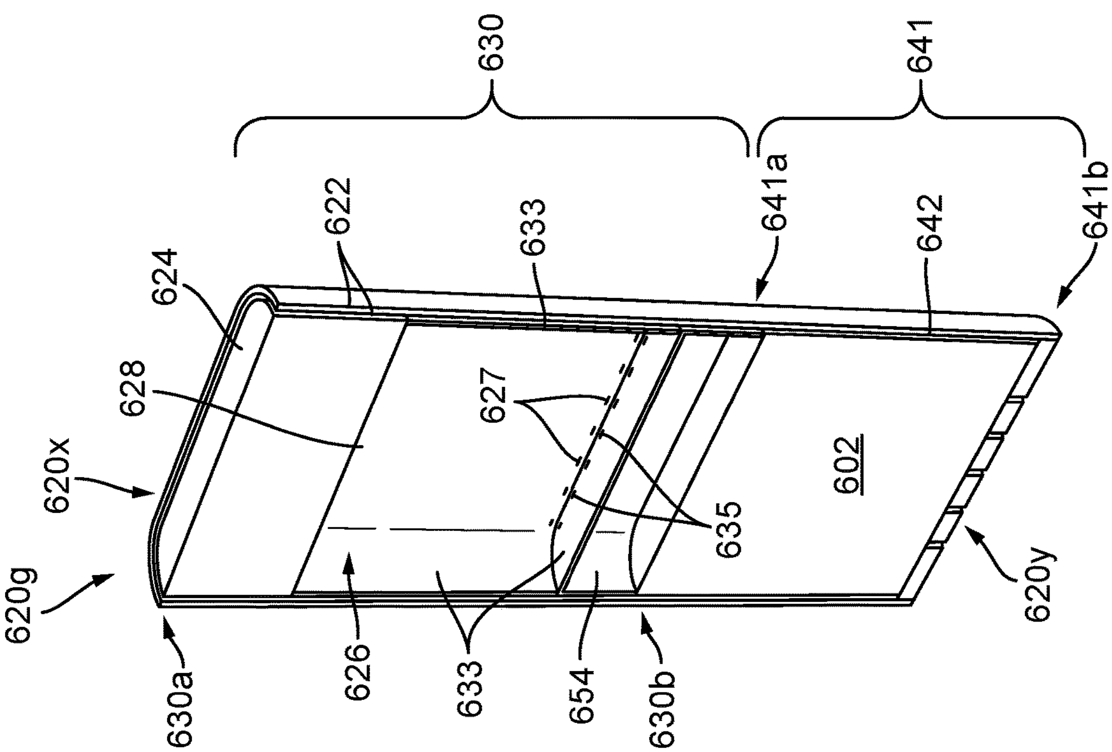

620e
620x
628
674
622
627
626b
630
641
641a
642
641b
602
620y
630a
626c
624b
627
624a
630b
626a
635

FIG. 6E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642
641b
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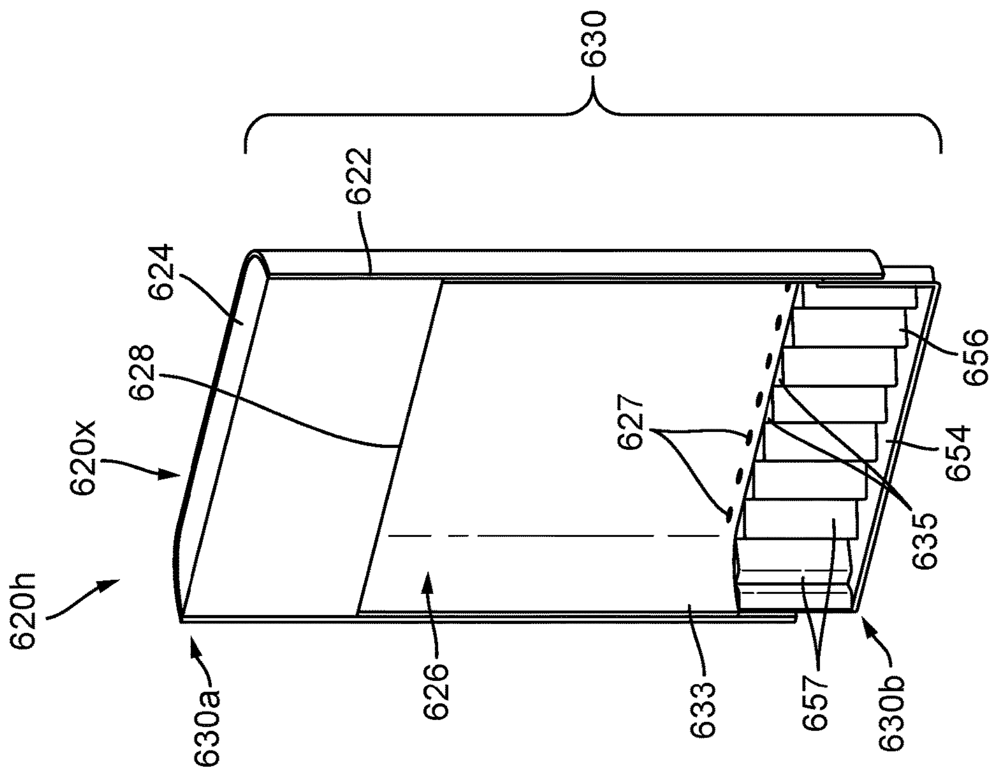
635
602
620y
630a
626
633
654
630b

FIG. 6G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630a
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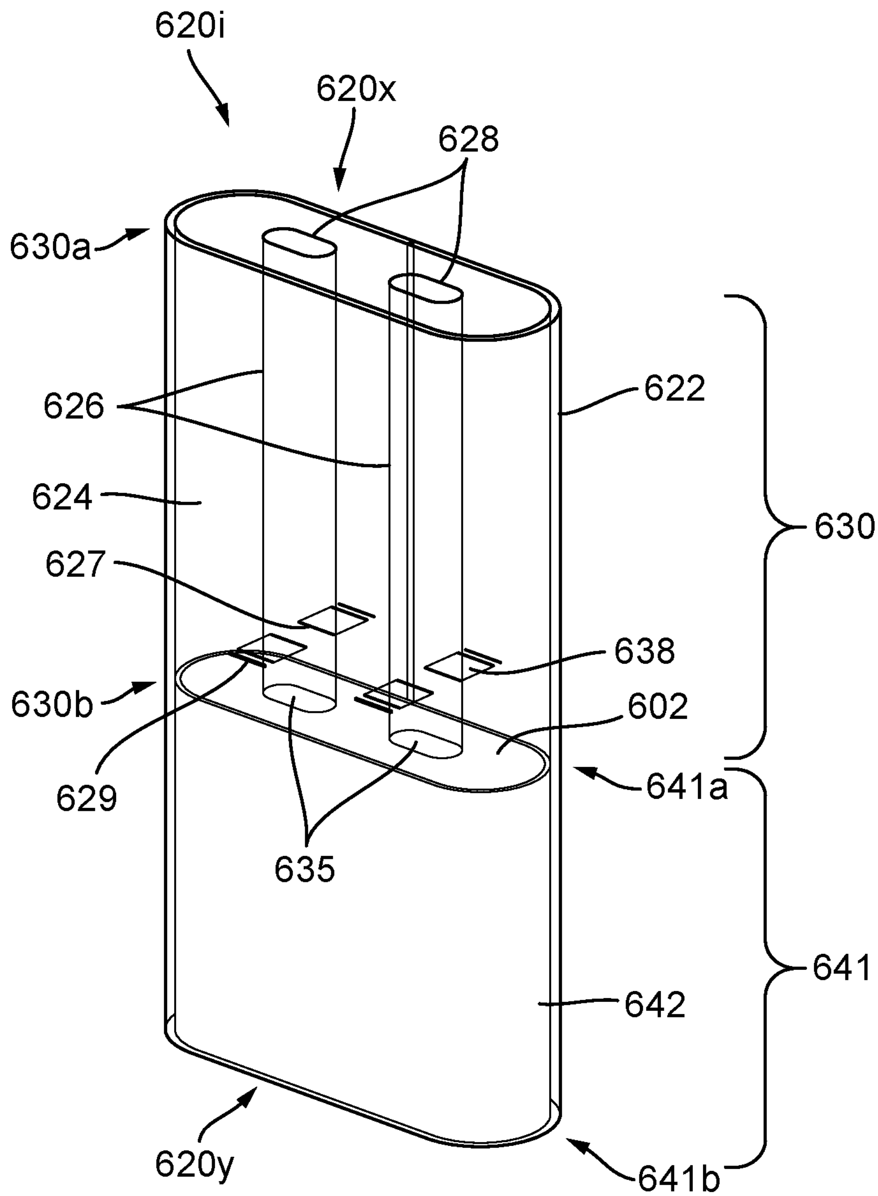
657
630b

FIG. 6H


620i
620x
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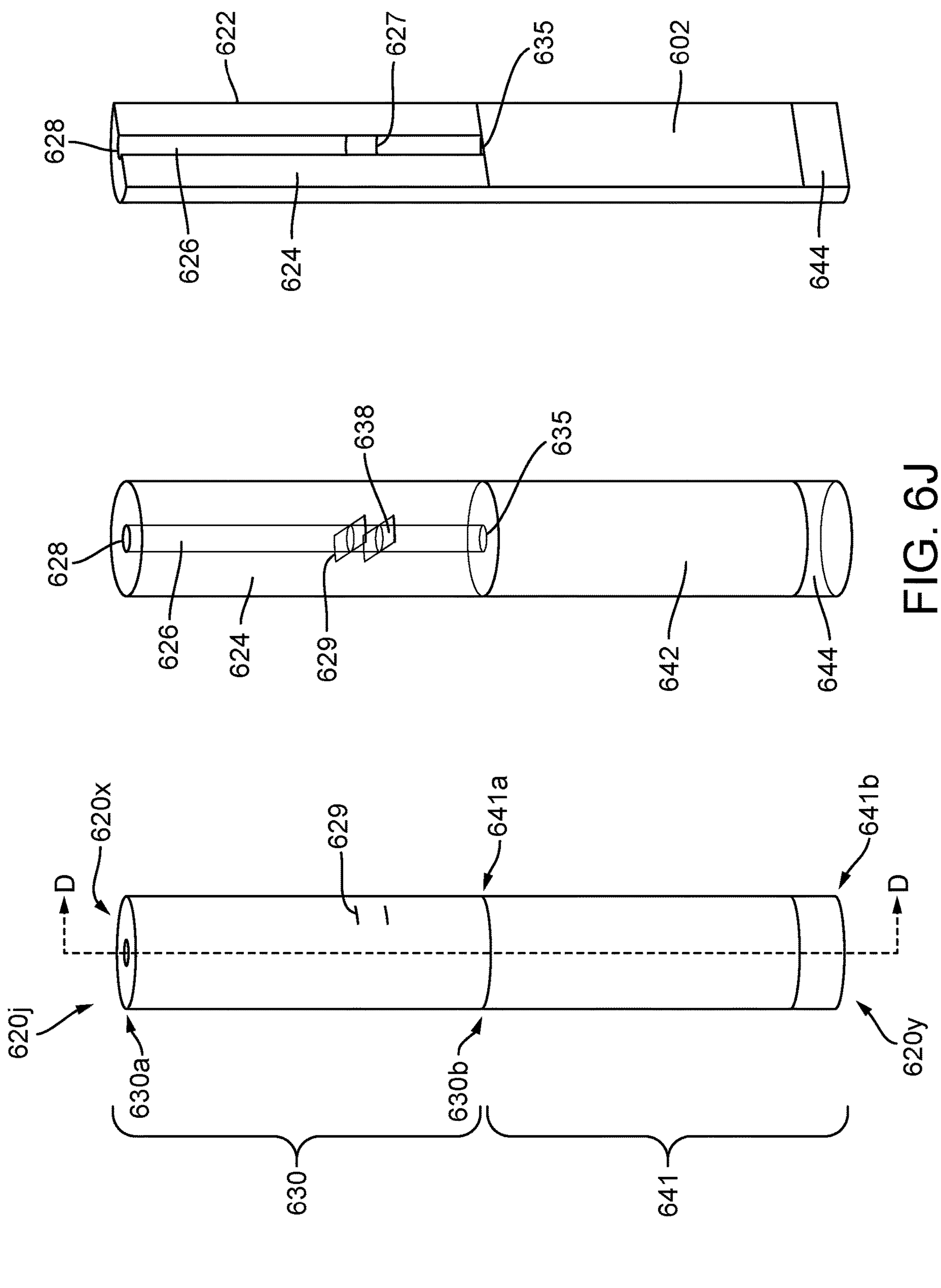
630a
626
622
624
630
627
638
630b
602
629
641a
635
641
642
620y
641b

FIG. 6I


622
627
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628
626
624
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620x
D
629
641a
641b
D
620j
630a
630b
620y
630
641

FIG. 6J

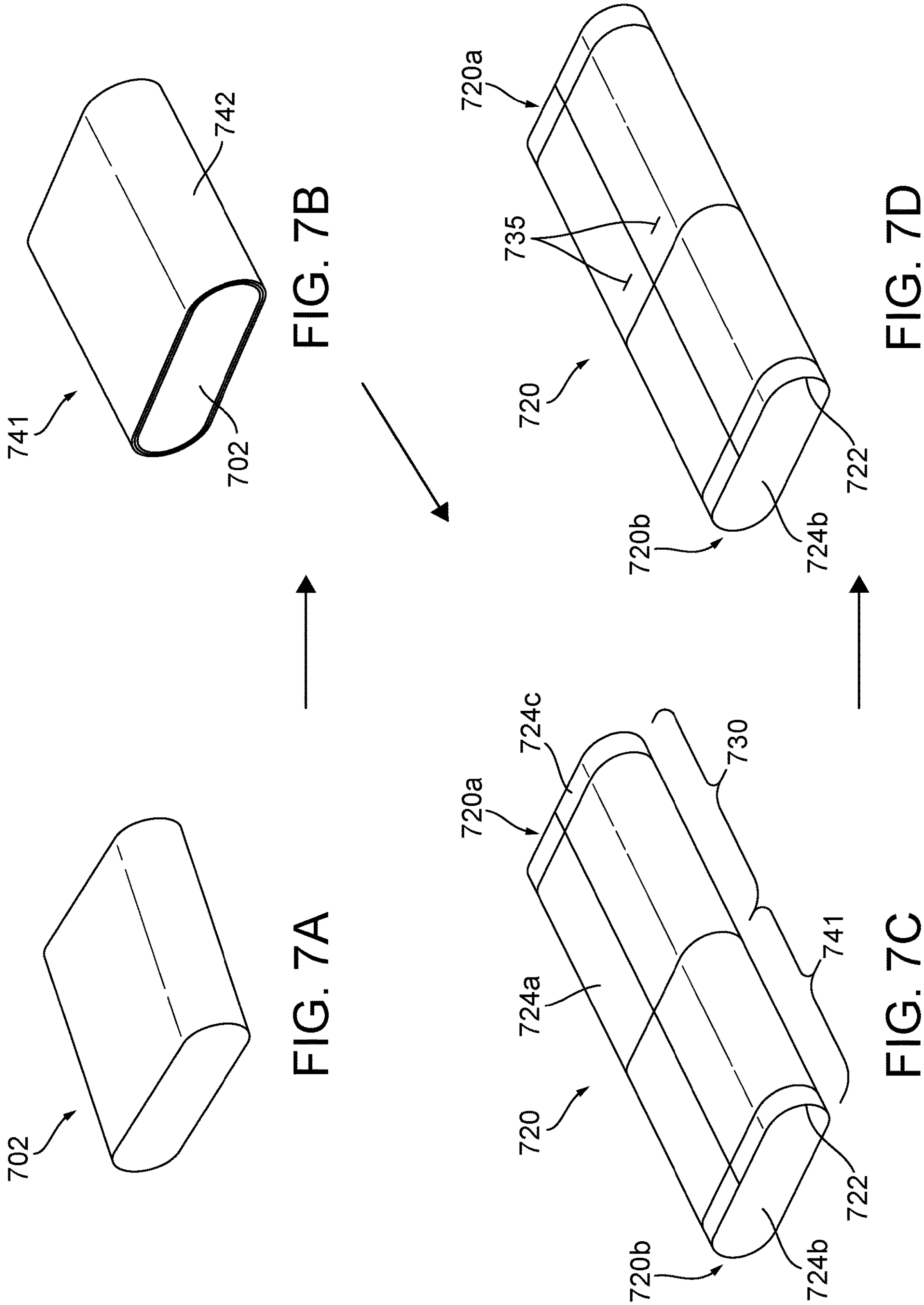

FIG. 7A

FIG. 7B

FIG. 7C

FIG. 7D

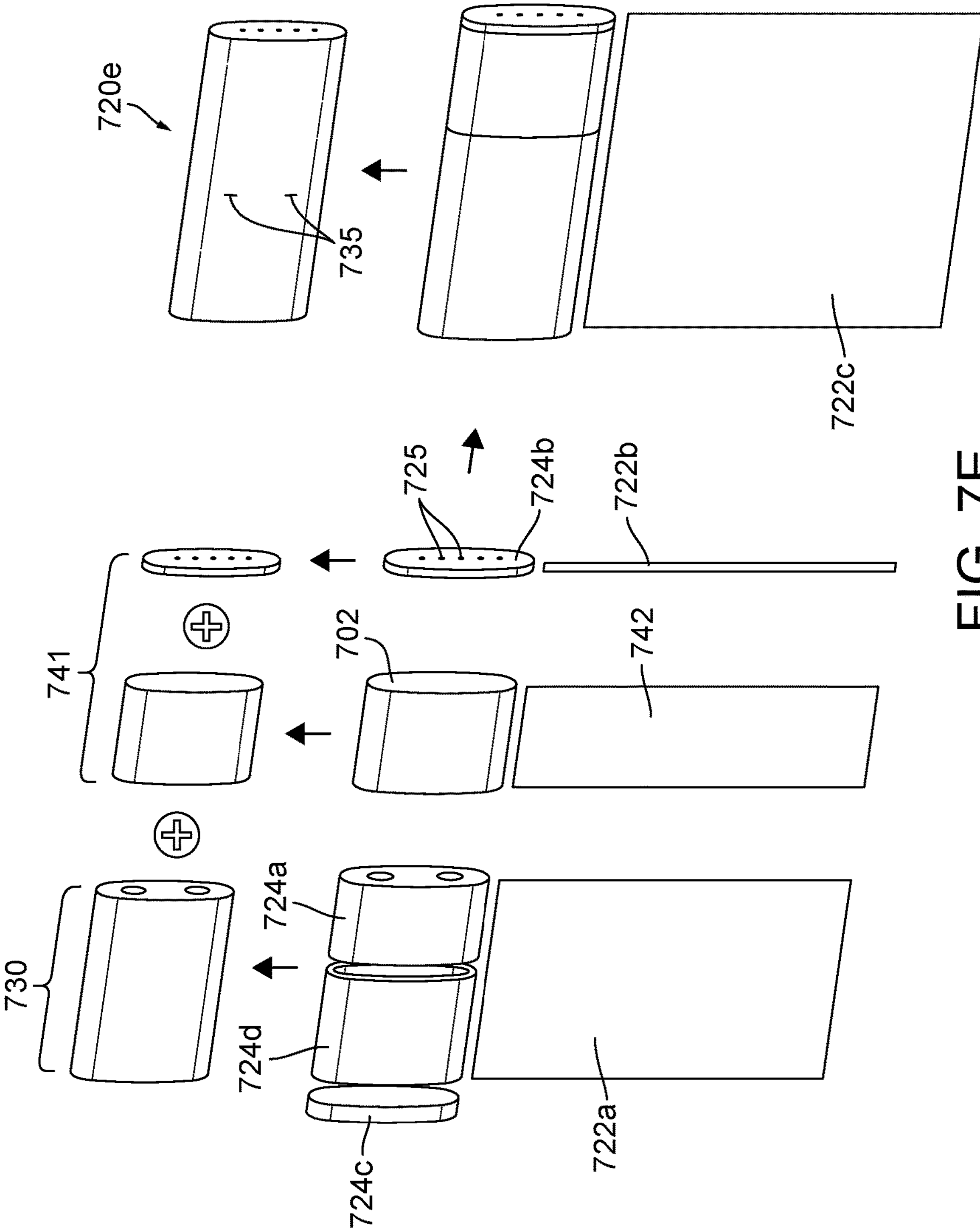
720e
735
722c
725
724b
722b
741
702
742
730
724a
724d
724c
722a

FIG. 7E

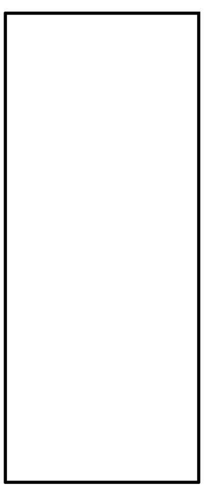

FIG. 8A

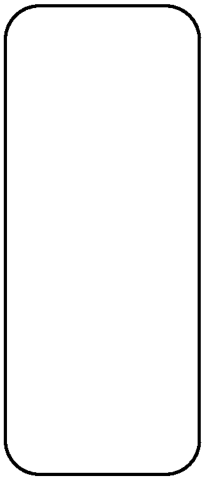

FIG. 8B

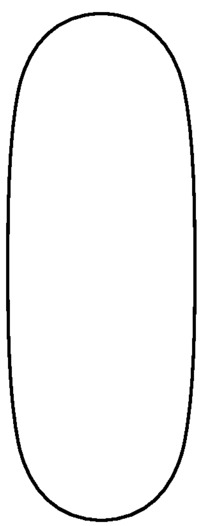

FIG. 8C

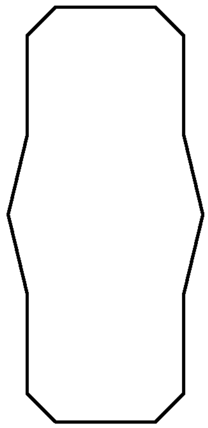

FIG. 8D

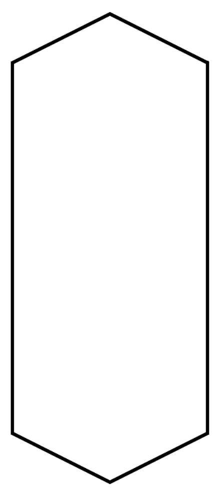

FIG. 8E

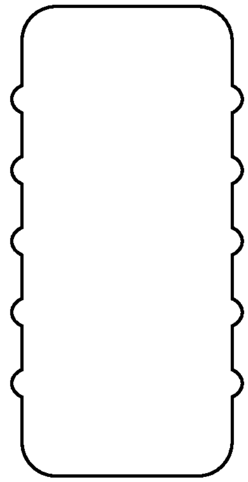

FIG. 8F

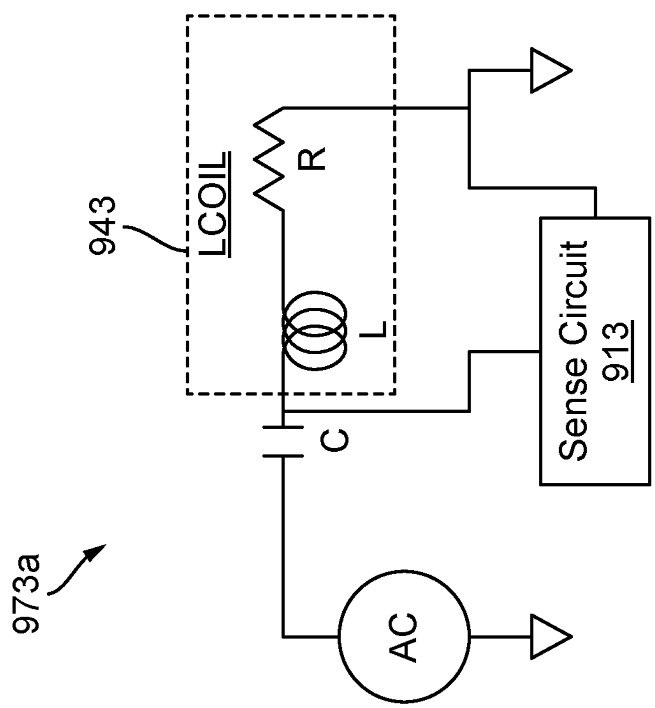
973a
943
LCOIL
R
L
C
AC
Sense Circuit
913

FIG. 9A

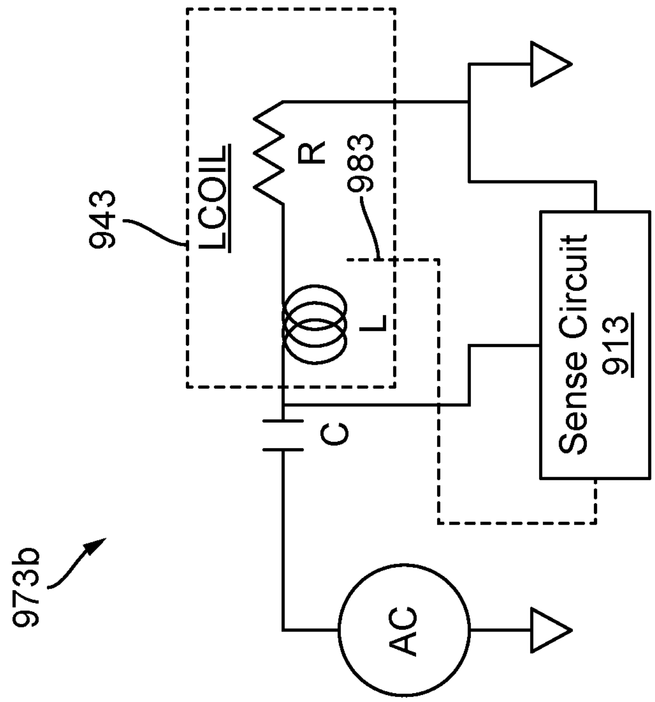
973b
943
LCOIL
R
983
L
C
AC
Sense Circuit
913

FIG. 9B

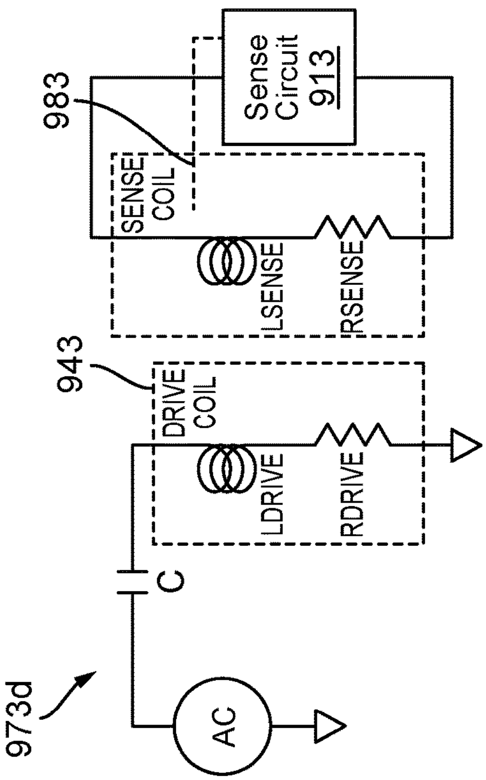

FIG. 9D

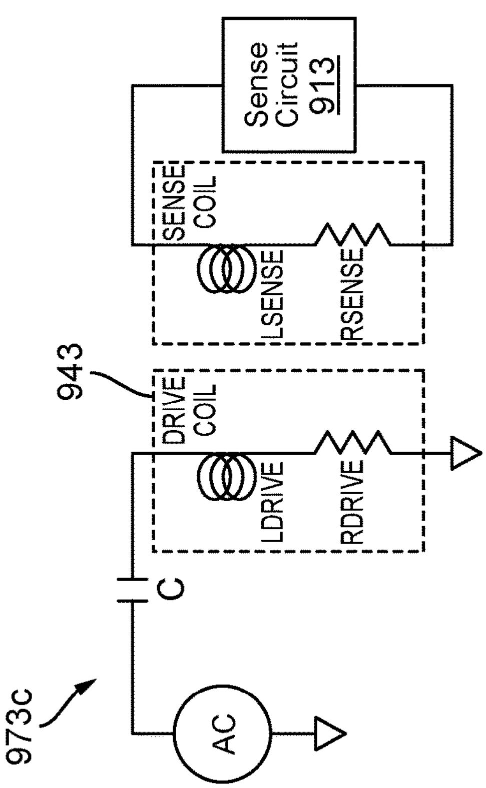

FIG. 9C

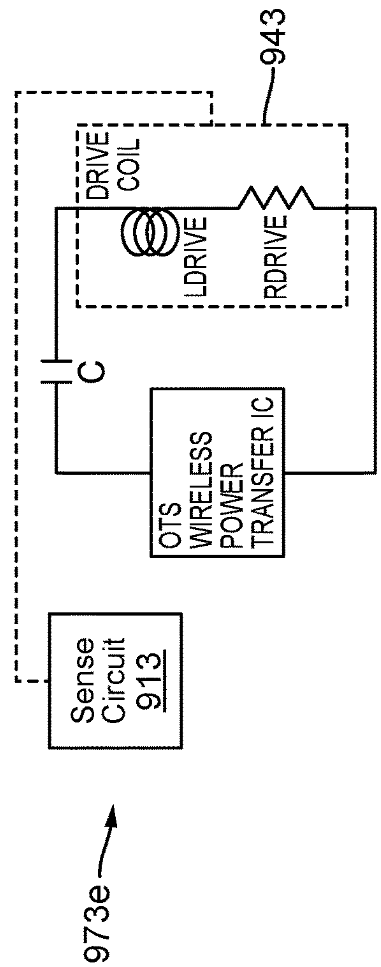

FIG. 9E

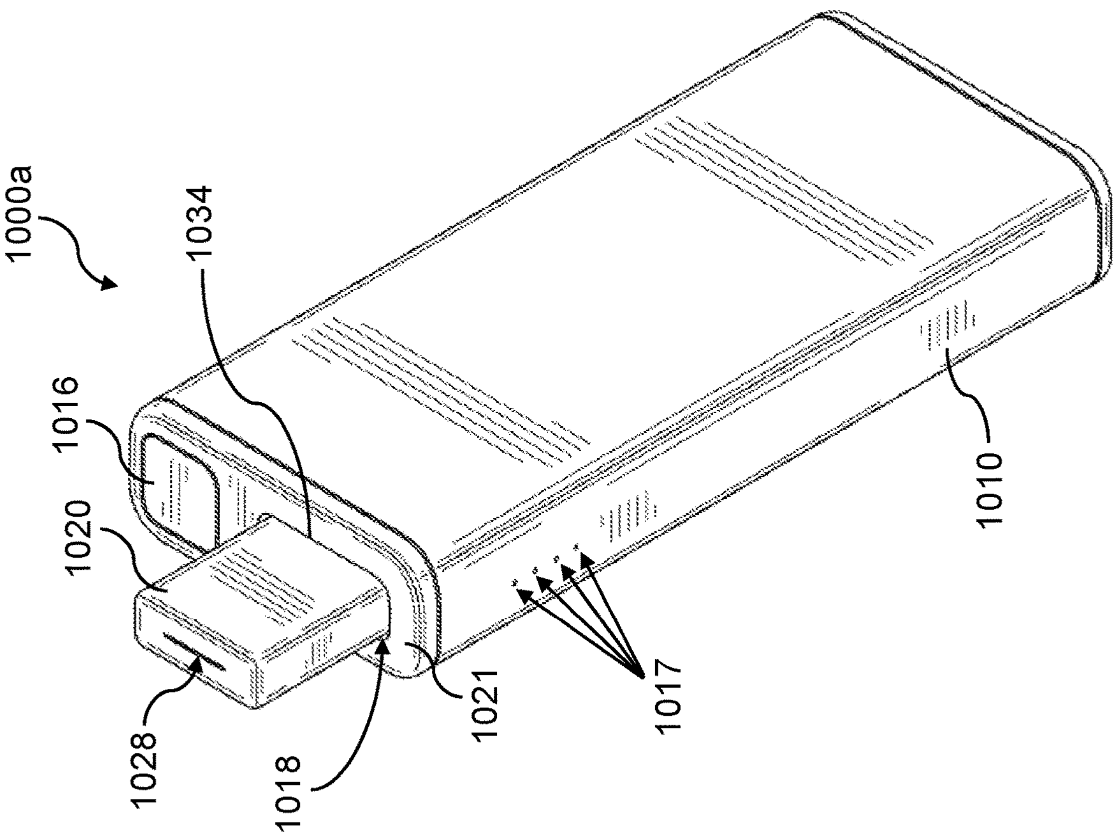

FIG. 10A

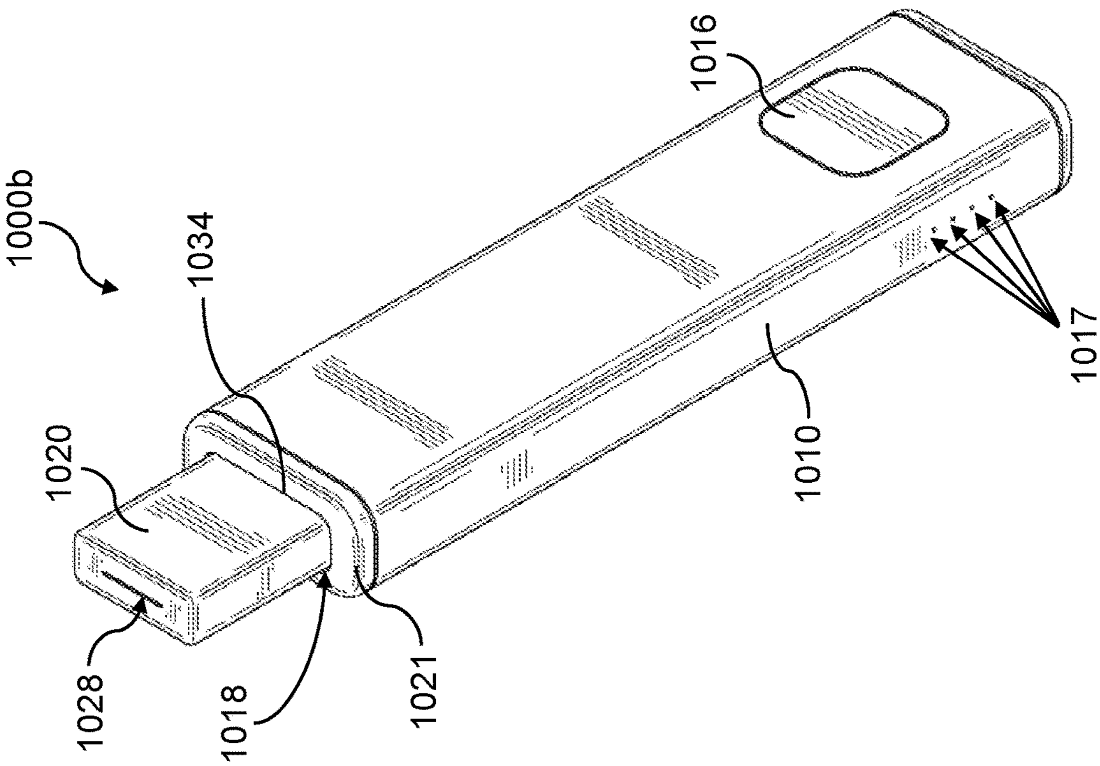

FIG. 10B

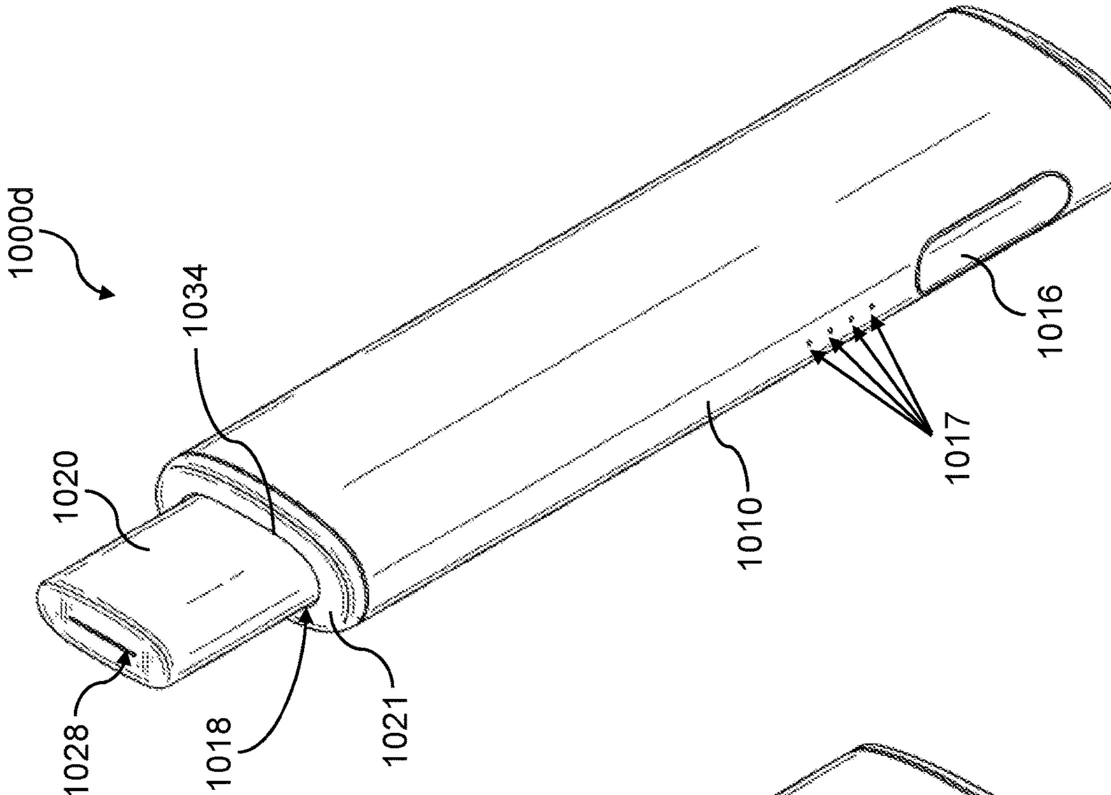

FIG. 10D

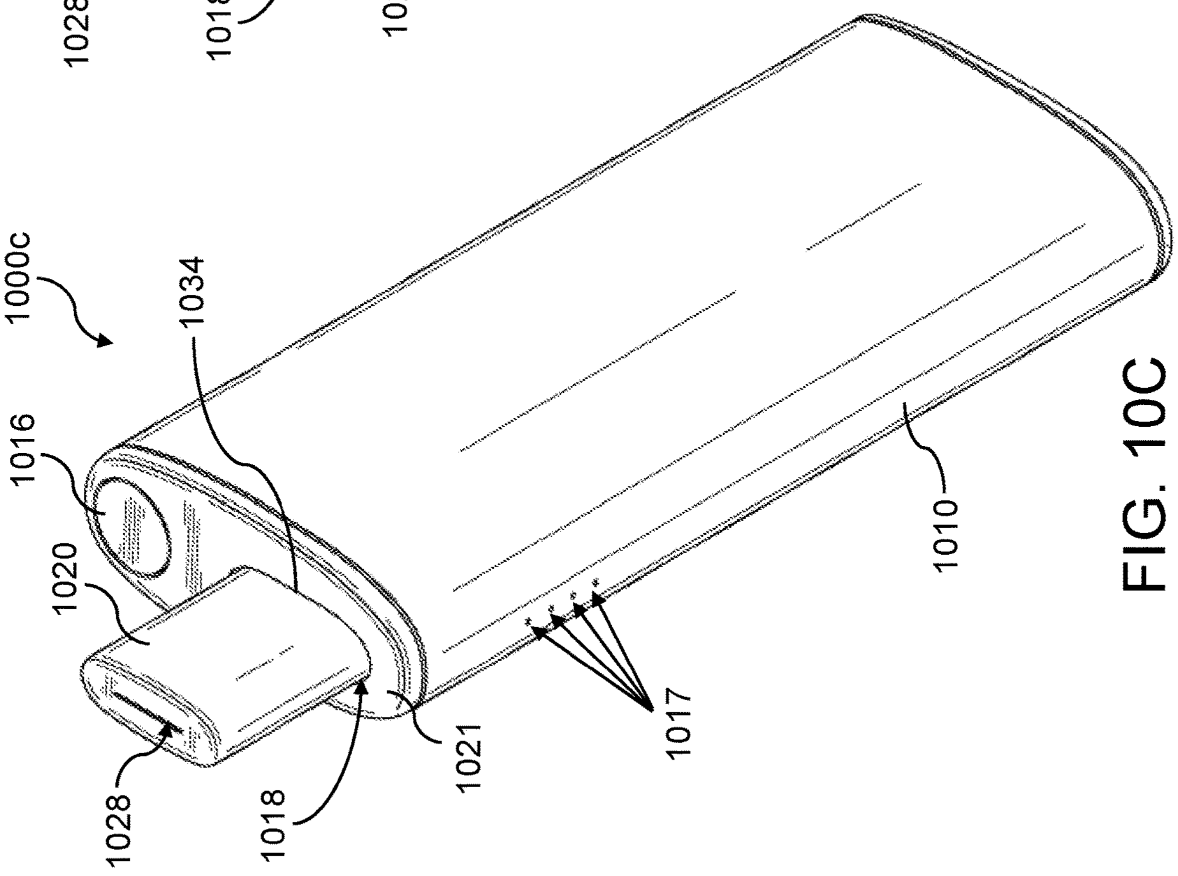

FIG. 10C

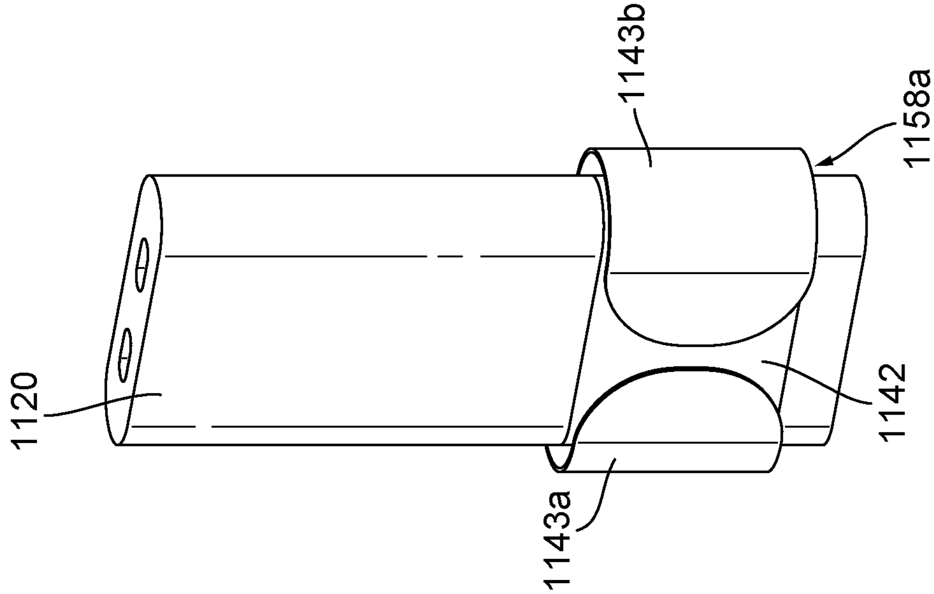

FIG. 11A

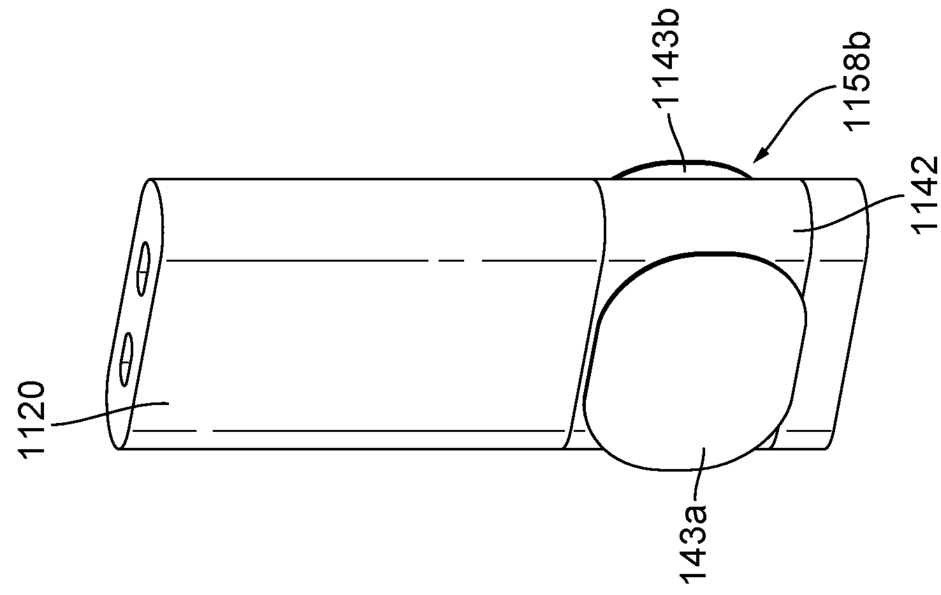

FIG. 11B

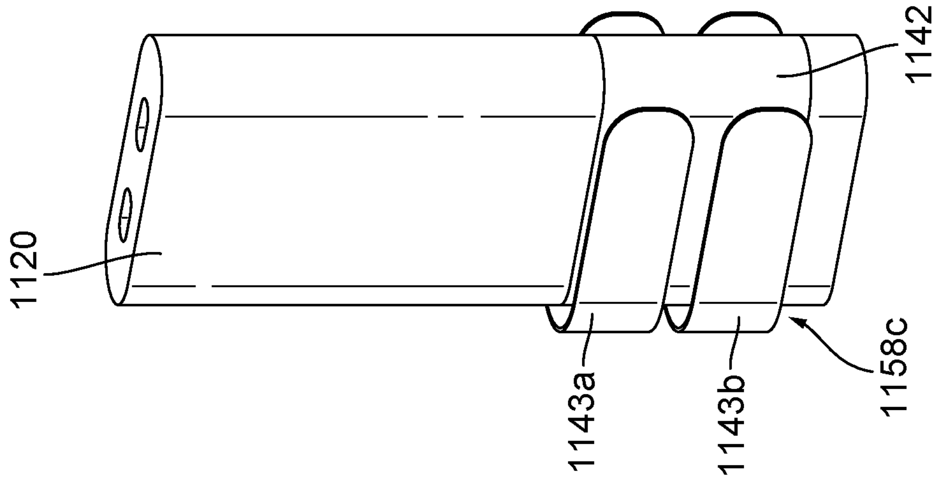

FIG. 11C

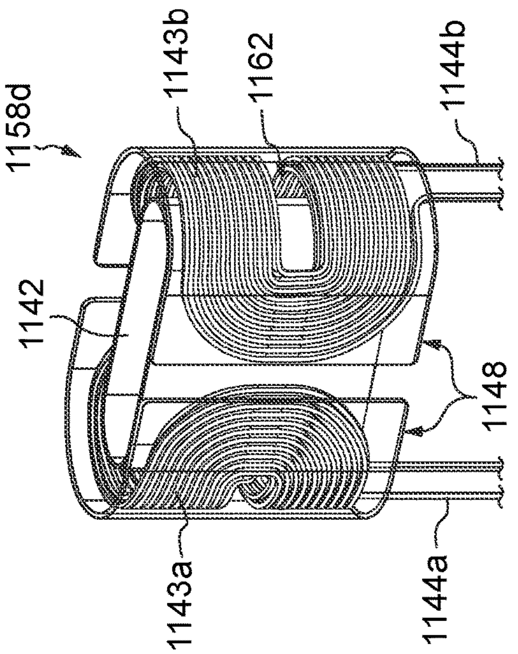

FIG. 11D

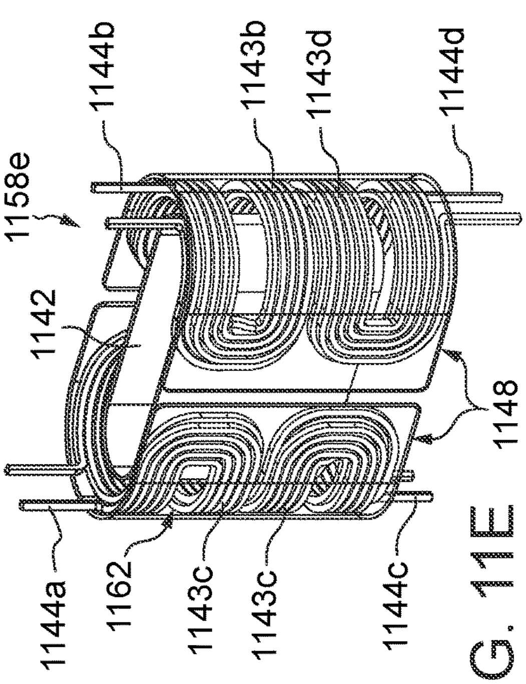

FIG. 11E

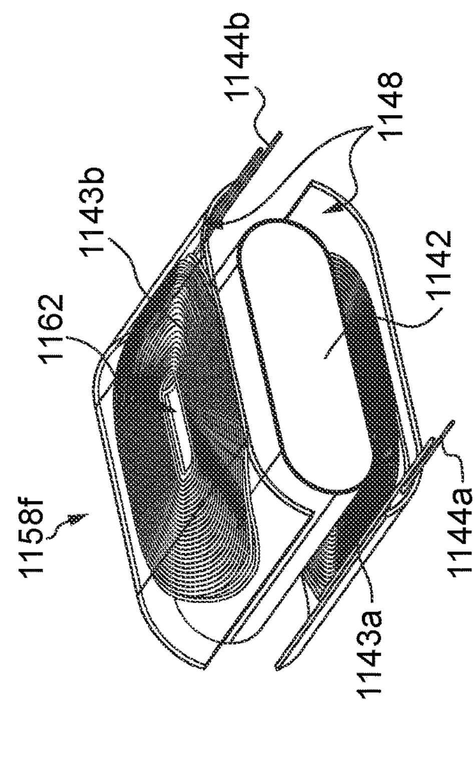

FIG. 11F

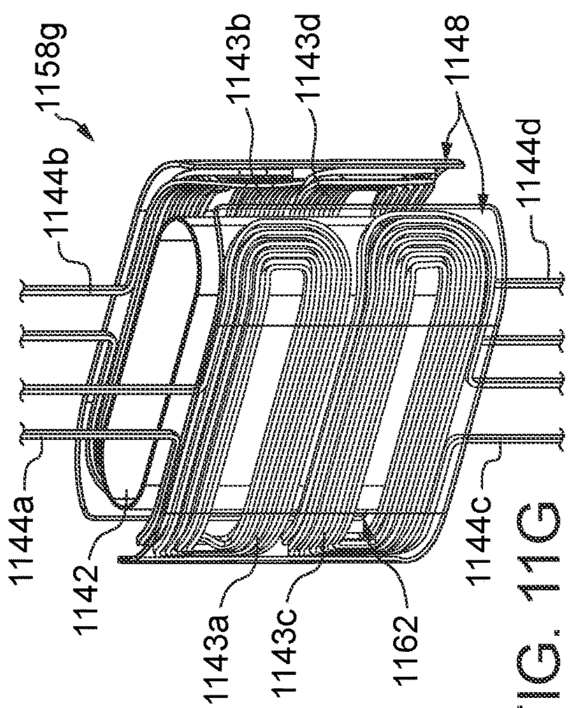

FIG. 11G

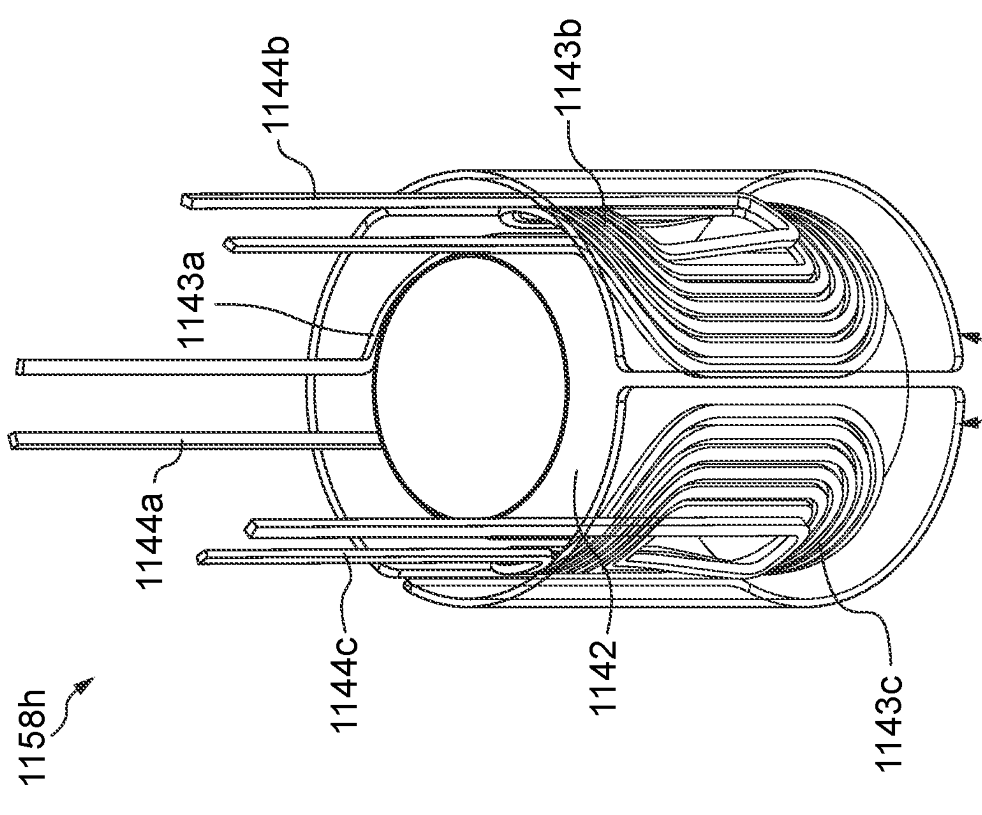

FIG. 11H

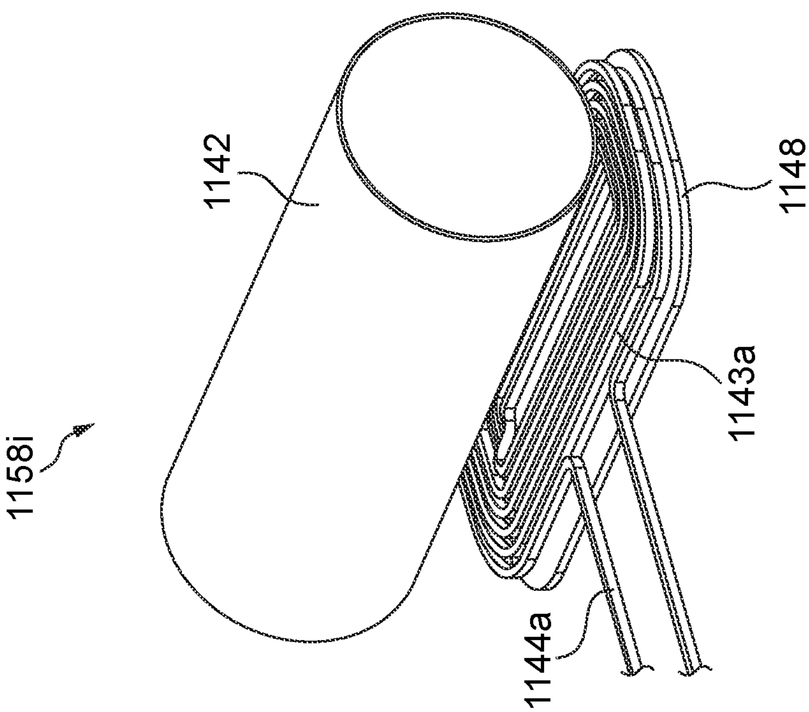

FIG. 11I

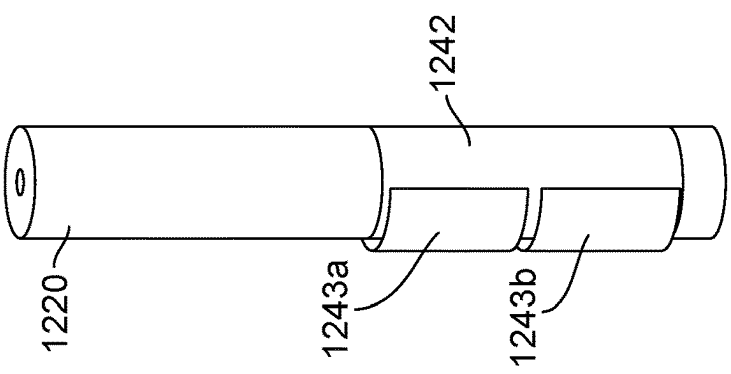

FIG. 12A

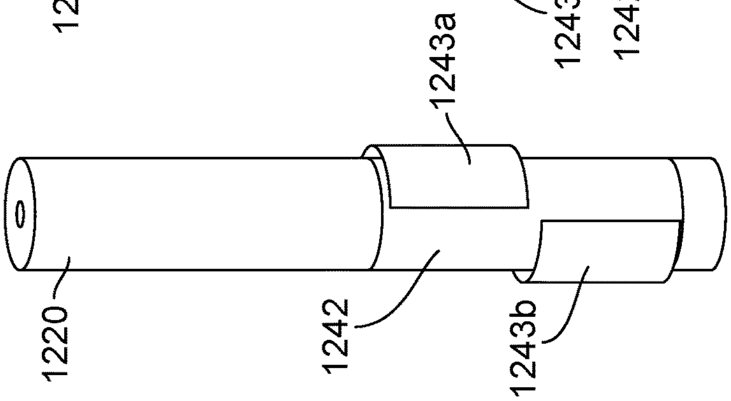

FIG. 12B

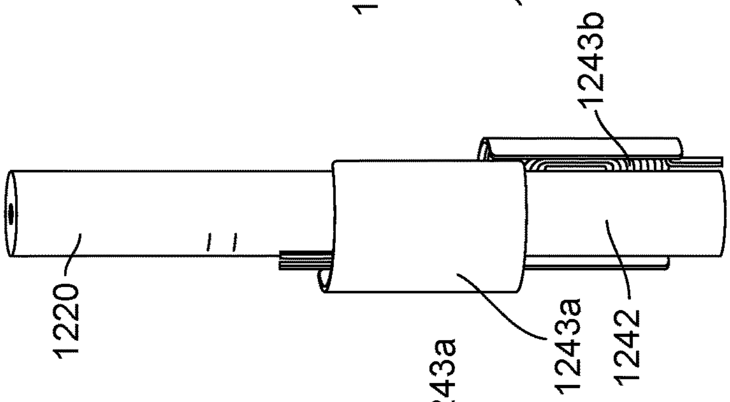

FIG. 12C

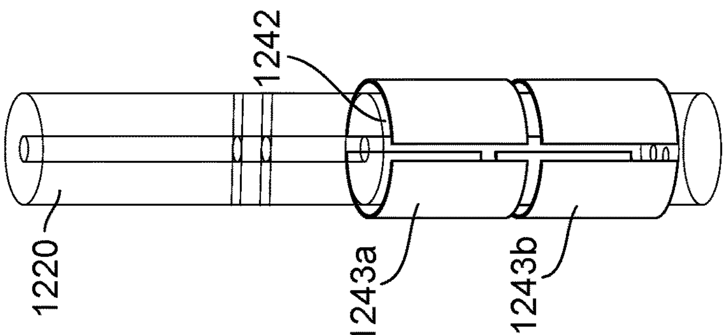

FIG. 12D

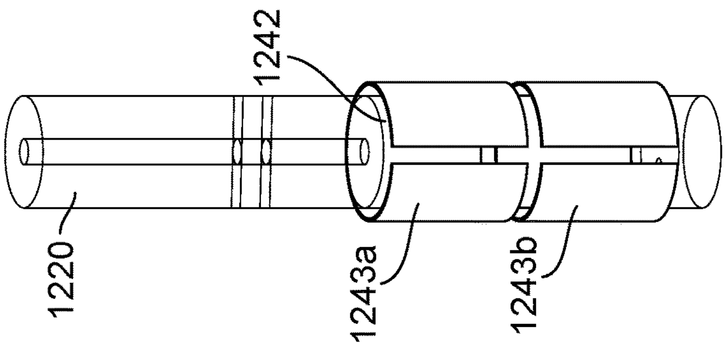

FIG. 12E

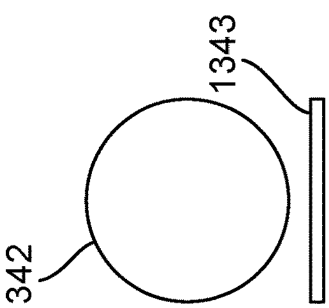

FIG. 13A

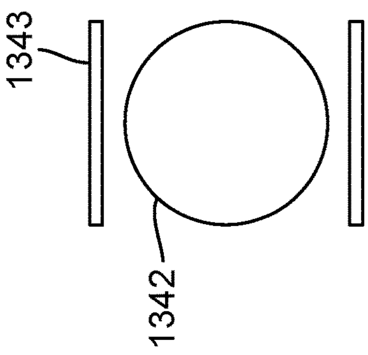

FIG. 13B

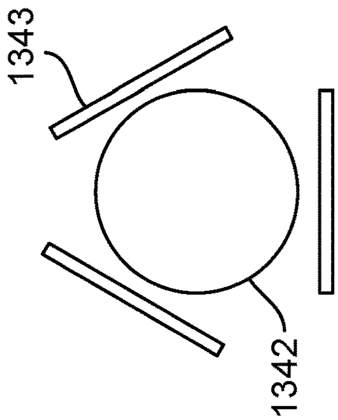

FIG. 13C

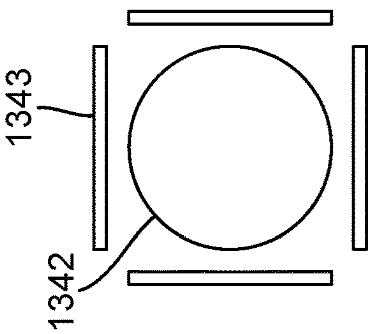

FIG. 13D

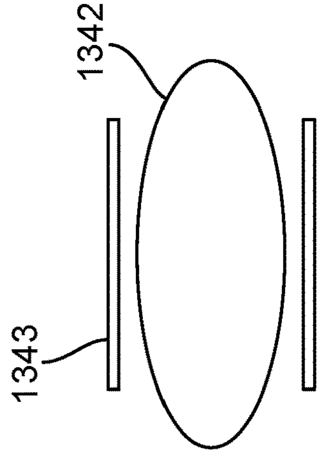

FIG. 13E

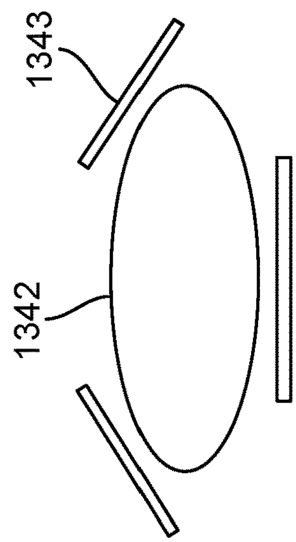

FIG. 13F

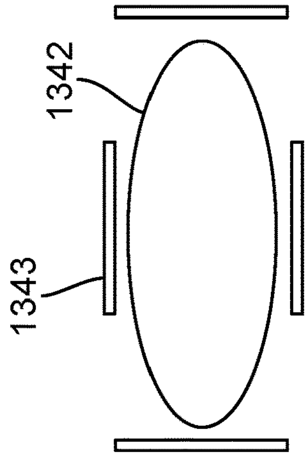

FIG. 13G

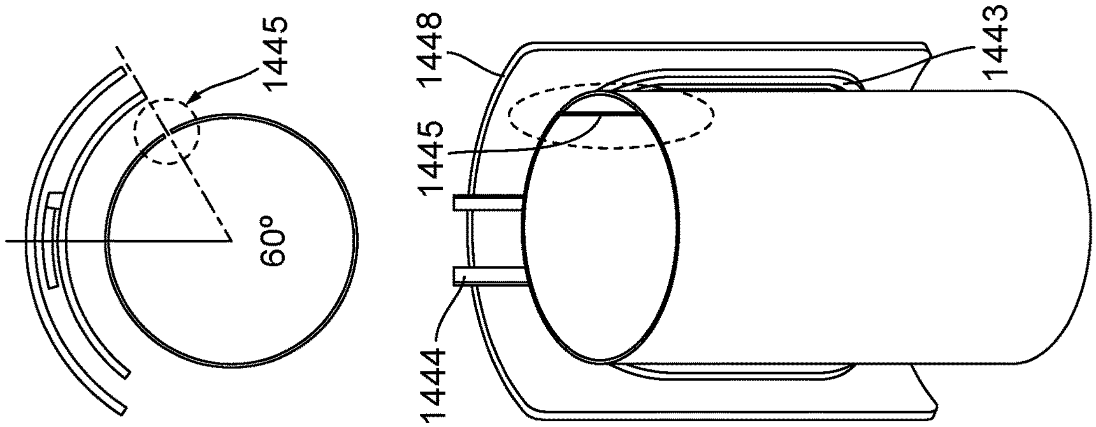

FIG. 14C

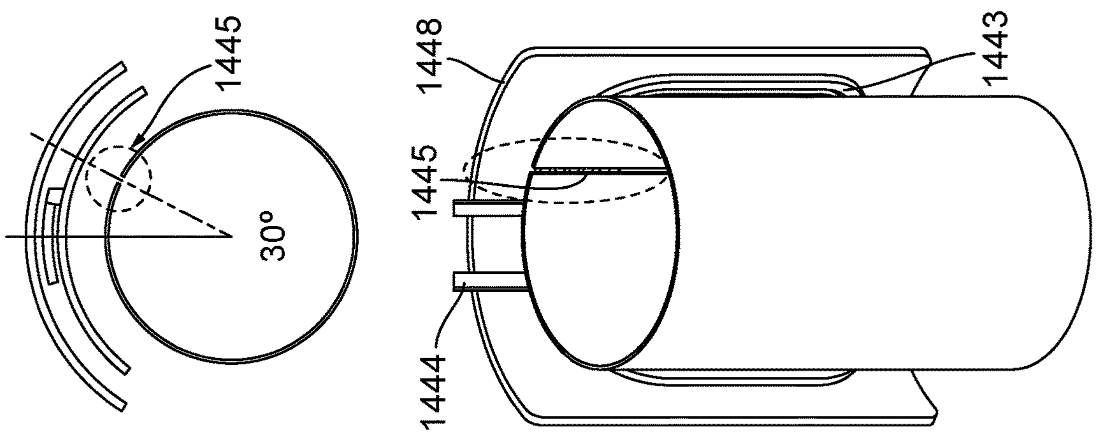

FIG. 14B

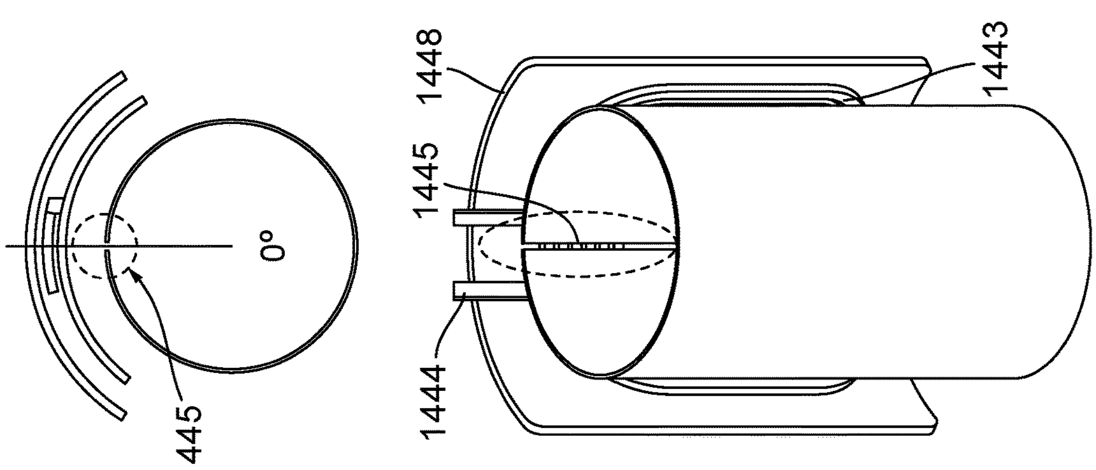

FIG. 14A

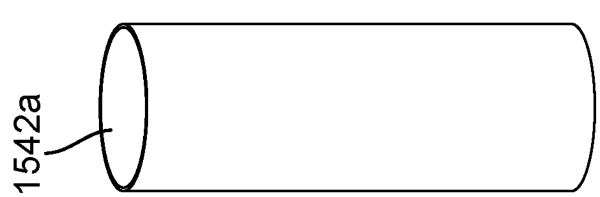

FIG. 15A

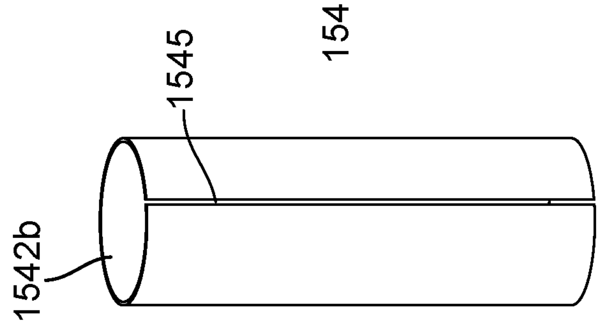

FIG. 15B

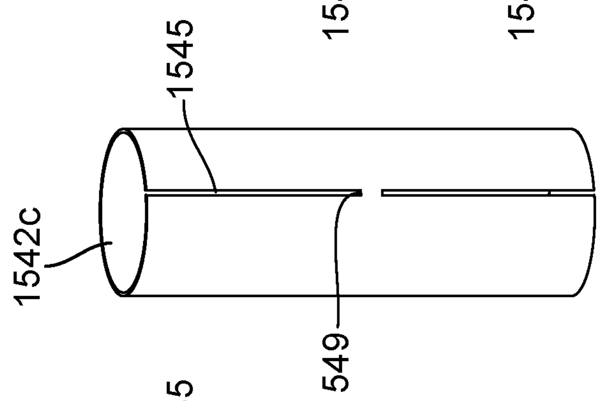

FIG. 15C

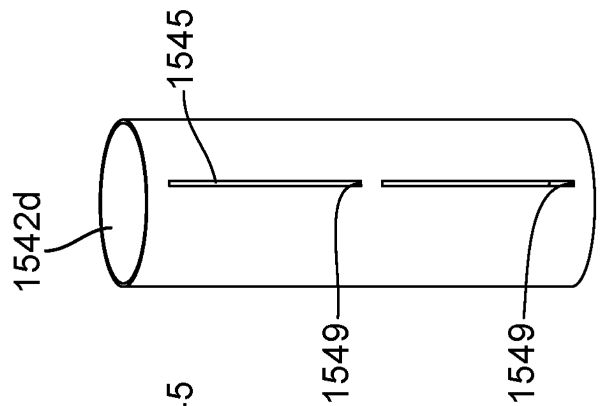

FIG. 15D

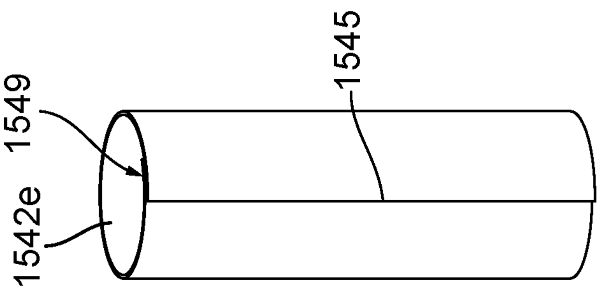

FIG. 15E

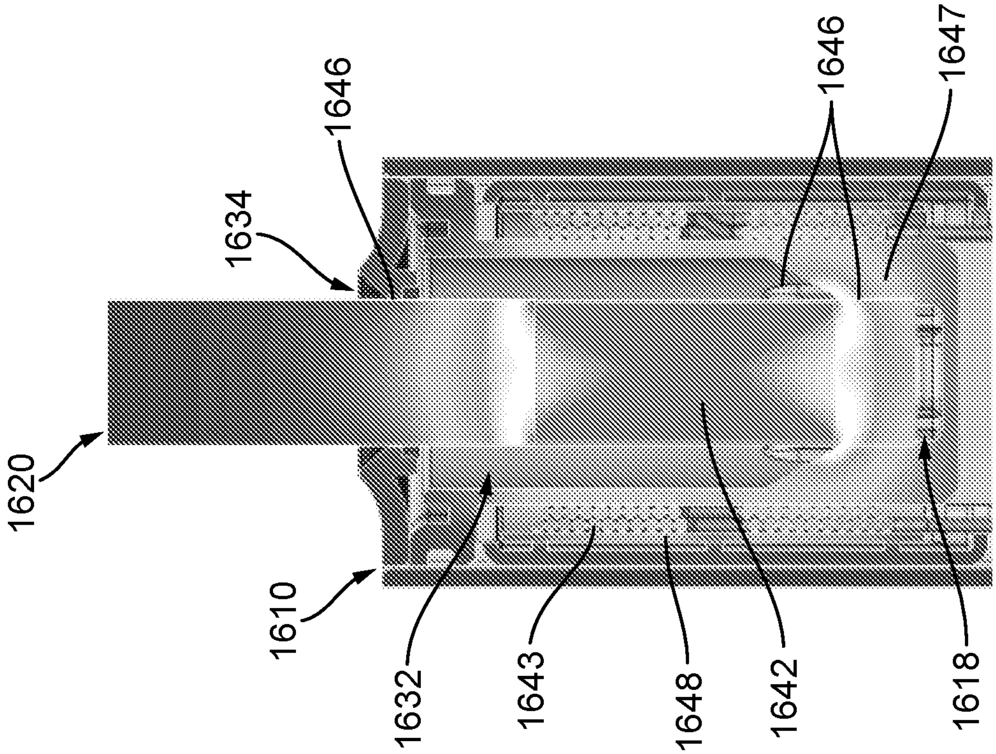

FIG. 16B

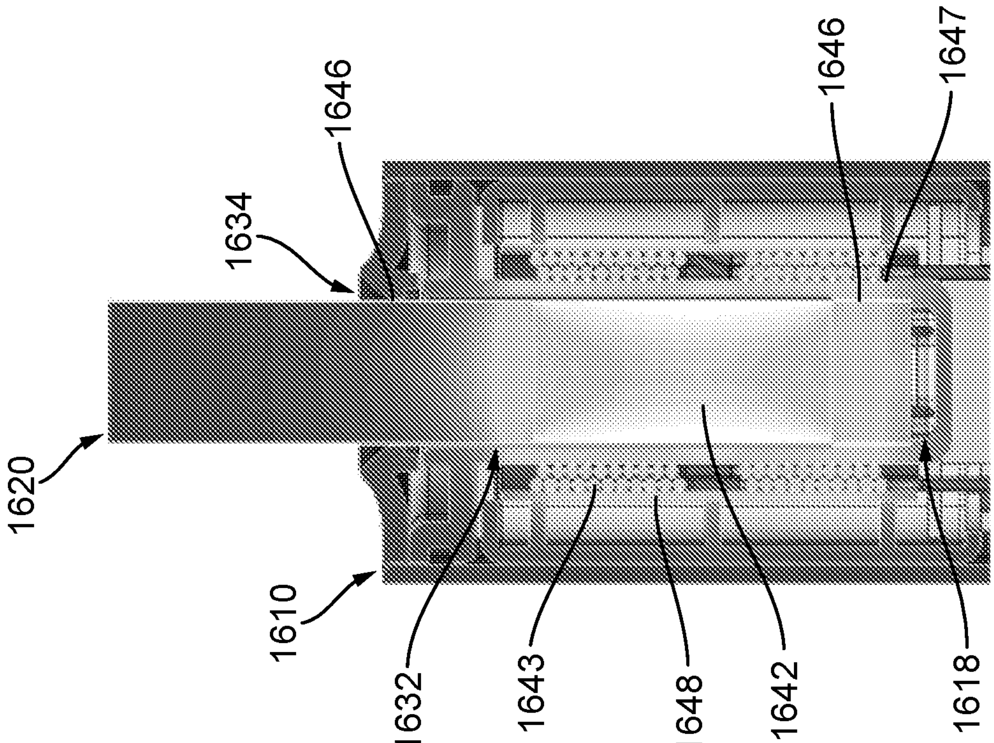

FIG. 16A

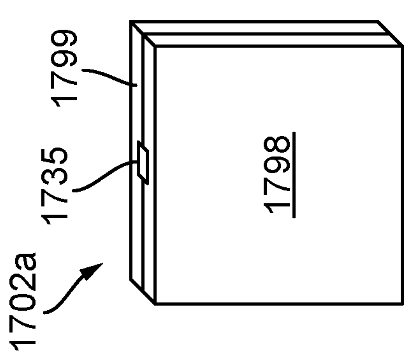

FIG. 17A

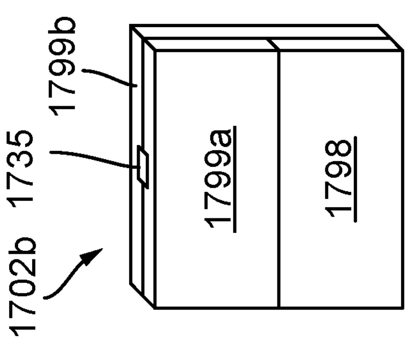

FIG. 17B

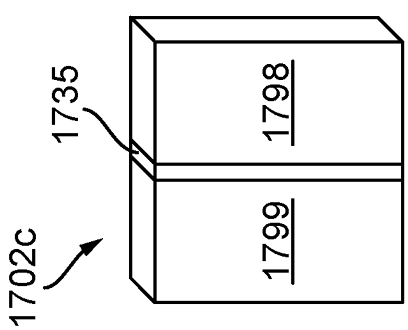

FIG. 17C

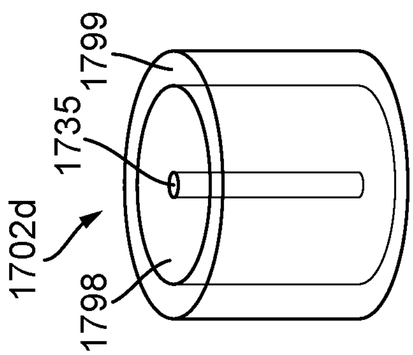

FIG. 17D

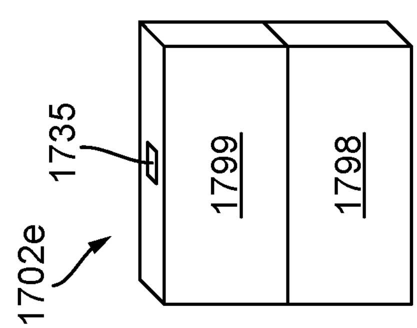

FIG. 17E

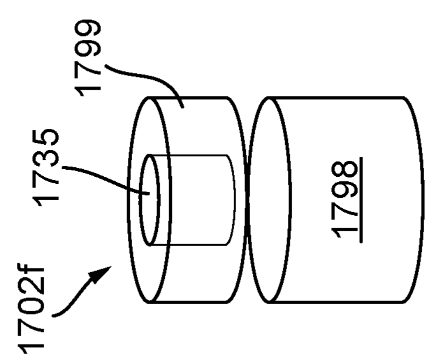

FIG. 17F

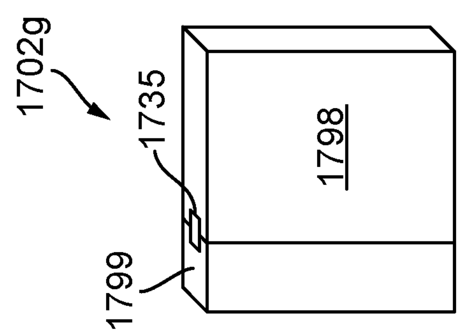

FIG. 17G

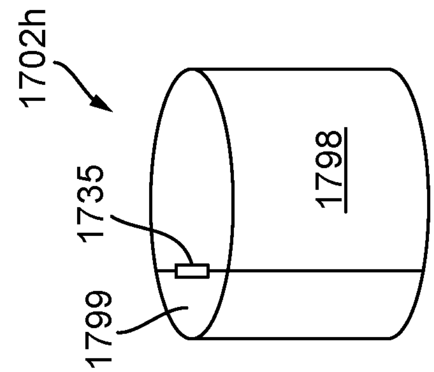

FIG. 17H

HEAT NOT BURN VAPORIZER DEVICES

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 63/422,899 filed Nov. 4, 2022 and entitled "HEAT NOT BURN VAPORIZER DEVICES," to Application No. 63/443,978 filed Feb. 7, 2023 and entitled "HEAT NOT BURN VAPORIZER DEVICES," and to U.S. Provisional Application No. 63/447,890 filed Feb. 23, 2023 and entitled "HEAT NOT BURN VAPORIZER DEVICES." The disclosures of the foregoing applications are incorporated herein by reference in their entirety.

TECHNICAL FIELD

[0002] The subject matter described herein relates to vaporizer devices, including vaporizer devices comprising a vaporizer body configured to heat a cartridge containing vaporizable material.

BACKGROUND

[0003] Vaporizer devices, which can also be referred to as vaporizers, electronic vaporizer devices, or e-vaporizer devices, can be used for delivery of an aerosol (for example, a gas-phase and/or a condensed-phase material suspended in a stationary or moving mass of air or some other gas carrier) containing one or more active ingredients by inhalation of the aerosol by a user of the vaporizer device. For example, electronic nicotine delivery systems (ENDS) include a class of vaporizer devices that are battery powered and that can be used to simulate the experience of smoking, but without burning of tobacco or other substances. Vaporizer devices are gaining increasing popularity both for prescriptive medical use, in delivering medicaments, and for consumption of tobacco, nicotine, and other plant-based materials. Vaporizer devices can be portable, self-contained, and/or convenient for use.

[0004] In use of a vaporizer device, the user inhales an aerosol, colloquially referred to as "vapor," which can be generated by a heating element that vaporizes (e.g., causes a liquid or solid to at least partially transition to the gas phase) a vaporizable material, which can be liquid, a solution, a solid, a paste, a wax, and/or any other form compatible for use with a specific vaporizer device. The vaporizable material used with a vaporizer device can be provided within a cartridge (e.g., a separable part of the vaporizer device that contains vaporizable material) that includes an outlet (e.g., a mouthpiece or an outlet in fluid communication with a mouthpiece) for inhalation of the aerosol by a user.

[0005] To receive an inhalable aerosol generated by a vaporizer device, a user may, in certain examples, activate the vaporizer device by taking a puff, by pressing a button, and/or by some other approach. A puff as used herein can refer to inhalation by the user in a manner that causes a volume of air to be drawn into the vaporizer device such that the inhalable aerosol is generated by a combination of vaporized material (e.g., gas-phase material) with the volume of air.

[0006] An approach by which a vaporizer device generates an inhalable aerosol from a vaporizable material involves heating the vaporizable material (e.g., within a cartridge, an insert, a vaporization chamber, a heater chamber, an oven, and/or a compartment associated with a heating element) to cause at least a portion of the vaporizable material to be converted to vaporized material (e.g., gas-phase material). A vaporization chamber, heater chamber, oven, or the like can refer to an area or volume in the vaporizer device within which a heat source (for example, a conductive, convective, and/or radiative heat source) causes heating of a vaporizable material to produce a vaporized material and allow the vaporized material to mix with air to form an aerosol for inhalation by a user of the vaporizer device.

[0007] Vaporizer devices can be controlled by one or more controllers, electronic circuits (for example, sensors, heating elements, buttons, switches), and/or the like on or in the vaporizer device. Vaporizer devices can also wirelessly communicate with an external controller (e.g., a computing device such as a personal computer or smartphone).

[0008] In some implementations, vaporizer cartridges that contain solid vaporizable material (e.g., comprising plant material such as tobacco leaves and/or parts of tobacco leaves) must be heated to undesirably high temperatures in order to cause inner regions of the vaporizable material to be heated to a minimum temperature required for vaporization. As a result, portions of the solid vaporizable material contained within a vaporizer cartridge can burn or char at these high temperatures and produce combustion or partial combustion byproducts (e.g., chemical elements or chemical compounds) that may have undesirable characteristics, such as unpleasant smells or tastes, negative health impacts, etc. Furthermore, uniform heating of the vaporizable material in current conduction-based vaporizers may be difficult to achieve due to the low thermal conductivity of certain vaporizable materials (e.g., plant materials, such as tobacco). Accordingly, controlled and even distribution of heat is desirable in such devices.

[0009] Some issues with current vaporizer devices include the inability to efficiently and effectively heat the vaporizable material without wasting a significant amount of energy. For example, some vaporizer devices include a heater body surrounding a tobacco consumable, requiring the entire heater body to be heated to create an oven. Such a configuration does not provide intimate contact with all heated surfaces, and additional energy is required to maintain a sufficiently high temperature in an area that is exposed to the airstream, thereby losing at least a portion of thermal energy produced by the heater that could have been used to heat the tobacco material. As such, energy may be wasted as the generated heat is not effectively utilized.

[0010] Vaporizer devices configured to embed some or part of a heater apparatus inside of the tobacco material may include airflow passing through the tobacco material thereby prohibiting tight tobacco compaction around the heater, thus diminishing heat transfer from the heater to the tobacco material. Furthermore, vaporizer devices with a heater element embedded within or at least partially surrounded by the tobacco may also experience cleaning and hygiene issues. For example, as the heater pierces the tobacco, residue may be left on the heater element after use, thereby requiring the user to clean the heater element before continued use.

SUMMARY

[0011] Aspects of the current subject matter relate to vaporizer devices including various implementation of a vaporizer body and/or cartridge of vaporizable material configured to generate an inhalable aerosol. For purposes of summarizing, certain aspects, advantages, and novel features have been described herein. It is to be understood that not all such advantages may be achieved in accordance with any one particular implementation. Thus, the disclosed subject matter may be implemented, embodied, or carried out in a manner that achieves or optimizes one advantage or group of advantages without achieving all advantages as may be taught or suggested herein. The various features and items described herein may be incorporated together or separable, except as would not be feasible based on the current disclosure and what a skilled artisan would understand from it.

[0012] In various implementations, a cartridge for use with a vaporizer device for generating an inhalable aerosol includes a heater portion and a mouthpiece portion. The heater portion includes a heating element configured to heat a vaporizable material to generate a vapor. The heating element can define at least a portion of a perimeter of a heater chamber containing the vaporizable material. The heater portion further includes one or more cartridge inlets configured to allow external air to enter the heater chamber and entrain the vapor. The mouthpiece portion includes at least one vapor inlet, one or more airflow outlet channels in fluid communication with the heater chamber through the at least one vapor inlet, and at least one airflow outlet configured to deliver the inhalable aerosol to a user. The mouthpiece portion can further include at least one bypass air inlet. The one or more airflow outlet channels can be in fluid communication with ambient air through the least one bypass air inlet. The one or more airflow outlet channels includes at least one condensation chamber configured to condense the entrained vapor (e.g., with the ambient air) to form at least a portion of the inhalable aerosol. The at least one airflow outlet is in fluid communication with the at least one condensation chamber.

[0013] In optional variants of the implementations described, the cartridge has a cartridge distal end and a cartridge proximal end opposite the cartridge distal end. The at least one airflow outlet is proximate the cartridge proximal end and/or the one or more cartridge inlets are proximate the cartridge distal end.

[0014] In optional variants of the implementations described, the cartridge has a cartridge length between the distal end and the proximal end of the cartridge, a cartridge depth that is transverse to the cartridge length, and a cartridge width that is transverse to the both the cartridge length and the cartridge depth, the cartridge width is longer than the cartridge depth, and the cartridge length is longer than both the cartridge depth and the cartridge width.

[0015] In optional variants of the implementations described, the cartridge has opposing long sides that are offset from each other along the cartridge depth and opposing short sides that are offset from each other along the cartridge width, a perimeter of the cartridge includes the long sides and the short sides, and the perimeter of the cartridge defines a non-cylindrical cross-section of the cartridge that is perpendicular to the cartridge length.

[0016] In optional variants of the implementations described, the cartridge width is at least 1.5 times as long as the cartridge depth.

[0017] In optional variants of the implementations described, the at least one bypass air inlet includes a plurality of bypass air inlets, the mouthpiece portion further includes a plurality of bypass channels extending from each of the plurality of bypass air inlets to a corresponding one of a plurality of bypass outlets, and each of the plurality of bypass channels is in fluid communication with at least one of the one or more airflow outlet channels.

[0018] In optional variants of the implementations described, the one or more airflow outlet channels include a first airflow outlet channel and a second airflow outlet channel, spaced apart along the cartridge width.

[0019] In optional variants of the implementations described, at least a portion of the plurality of bypass channels are angled, downward with respect to a plane formed by the cartridge width and the cartridge depth, and towards the at least one vapor inlet, into a corresponding airflow outlet channel of the one or more airflow outlet channels to produce turbulent airflow within the at least one condensation chamber.

[0020] In optional variants of the implementations described, at least a portion of the plurality of bypass channels are angled, upwards with respect a plane formed by to the cartridge width and the cartridge depth, and towards the at least one airflow outlet, into a corresponding airflow outlet channel of the one or more airflow outlet channels to produce turbulent airflow within the at least one condensation chamber.

[0021] In optional variants of the implementations described, at least a portion of the plurality of bypass channels are offset from each other, along the cartridge width and along the cartridge length, to produce turbulent airflow within the at least one condensation chamber.

[0022] In optional variants of the implementations described, the mouthpiece portion further includes a mouthpiece insert, and one or more of the at least one vapor inlet, the at least one bypass air inlet, and the one or more airflow outlet channels are formed through the mouthpiece insert.

[0023] In optional variants of the implementations described, each of the at least one vapor inlet, the at least one bypass air inlet, and the one or more airflow outlet channels are laser cut through the mouthpiece insert.

[0024] In optional variants of the implementations described, the one or more airflow outlet channels originate at the at least one vapor inlet and terminate at the at least one airflow outlet.

[0025] In optional variants of the implementations described, the mouthpiece insert is proximate the proximal end of the cartridge, and the mouthpiece insert is in fluid communication with the least one airflow outlet. Optionally the mouthpiece insert is an end cap.

[0026] In optional variants of the implementations described, the mouthpiece insert includes an air-permeable or vapor-permeable material configured to allow the inhalable aerosol to pass through the material.

[0027] In optional variants of the implementations described, the mouthpiece insert includes a pass-through filter includes a hollowed volume configured to allow the inhalable aerosol to pass through the hollowed volume.

[0028] In optional variants of the implementations described, the mouthpiece insert includes one or more of paper material, cardstock, corrugated material, cardboard, tobacco paper, temperature-resistant plastic, cellulose acetate, non-wood plant fibers, flax, hemp, sisal, rice straw, and esparto.

[0029] In optional variants of the implementations described, the heater portion further includes a heater insert proximate the distal end of the cartridge, and the heater insert is in fluid communication with the one or more cartridge inlets. Optionally the heater insert is an end cap.

[0030] In optional variants of the implementations described, the heater insert includes an air-permeable material configured to allow the external air to pass through the material.

[0031] In optional variants of the implementations described, the heater insert includes a pass-through filter includes a hollowed volume configured to allow the external air to pass through the hollowed volume.

[0032] In optional variants of the implementations described, the heater insert includes one or more of paper material, cardstock, corrugated material, cardboard, tobacco paper, temperature-resistant plastic, cellulose acetate, non-wood plant fibers, flax, hemp, sisal, rice straw, and esparto.

[0033] In optional variants of the implementations described, the at least one vapor inlet includes a first vapor inlet and a second vapor inlet, the one or more airflow outlet channels includes a first airflow outlet channel in fluid communication with the first vapor inlet, a second airflow outlet channel in fluid communication with the second vapor inlet, and a third airflow outlet channel in fluid communication with each of the first airflow outlet chamber and the second airflow outlet chamber. Optionally the third airflow outlet channel is in fluid communication with the at least one airflow outlet.

[0034] In optional variants of the implementations described, a width of the third airflow outlet channel along the cartridge width is greater than a combined width of both the first airflow outlet channel and the second airflow outlet channel along the cartridge width.

[0035] In optional variants of the implementations described, the first airflow outlet channel and the second airflow outlet channel are formed within a first insert, and the third airflow outlet channel is formed within a second insert.

[0036] In optional variants of the implementations described, the second insert is stacked on top of the first insert along the cartridge length, and optionally the mouthpiece further includes a third insert that is an end cap staked on top of the second insert along the cartridge length.

[0037] In optional variants of the implementations described, the one or more airflow outlet channels includes a first airflow outlet channel in fluid communication with the at least one vapor inlet, a second airflow outlet channel in fluid communication with the first airflow outlet channel and the at least one airflow outlet, and a third airflow outlet channel in fluid communication with the first airflow outlet channel and the at least one airflow outlet.

[0038] In optional variants of the implementations described, a width of the first airflow outlet channel along the cartridge width is greater than a combined width of both the second airflow outlet channel and the third airflow outlet channel along the cartridge width.

[0039] In optional variants of the implementations described, the first airflow outlet channel is formed within a first insert, and the second airflow outlet channel and the third airflow outlet channel are formed within a second insert.

[0040] In optional variants of the implementations described, the second insert is stacked on top of the first insert along the cartridge length, and optionally the mouthpiece further includes a third insert that is an end cap staked on top of the second insert along the cartridge length.

[0041] In optional variants of the implementations described, the mouthpiece portion further includes a divider, and the mouthpiece portion further includes walls defining at least a portion of the one or more airflow outlet channels.

[0042] In optional variants of the implementations described, the at least one vapor inlet includes a first plurality of vapor inlets formed through the divider and a second plurality of vapor inlets formed through the one or more walls.

[0043] In optional variants of the implementations described, the divider abuts the walls such that the first plurality of vapor inlets are adjacent the second plurality of vapor inlets.

[0044] In optional variants of the implementations described, the at least one bypass air inlet is formed though the walls and adjacent the second plurality of vapor inlets to produce turbulent airflow within the at least one condensation chamber.

[0045] In optional variants of the implementations described, each of the at least one bypass air inlet and each of the at least one vapor inlet include openings, in fluid communication with the one or more airflow outlet channels, that are less than 1 mm in diameter.

[0046] In optional variants of the implementations described, the cartridge further includes a divider defining at least a portion of the one or more airflow outlet channels, and the mouthpiece portion further includes walls further defining at least a portion of the one or more airflow outlet channels.

[0047] In optional variants of the implementations described, the at least one vapor inlet includes a plurality of vapor inlets formed through the divider, and the divider abuts the walls such that the plurality of vapor inlets are adjacent the at least one bypass air inlet.

[0048] In optional variants of the implementations described, the at least one bypass air inlet is formed though the walls and adjacent the plurality of vapor inlets to produce turbulent airflow within the at least one condensation chamber.

[0049] In optional variants of the implementations described, the mouthpiece portion further includes a divider, the divider includes the at least one vapor inlet and the at least one bypass air inlet, and the divider is in fluid communication with the one or more airflow outlet channels.

[0050] In optional variants of the implementations described, the mouthpiece portion further includes a plurality of baffles within the one or more airflow outlet channels, and each of the plurality of baffles extends from one of the short sides of the cartridge, along at least part of the cartridge width, and towards the other of the short sides of the cartridge.

[0051] In optional variants of the implementations described, the plurality of baffles produces an airflow path within the at least one condensation chamber that is elongated relative to a length of the mouthpiece portion along the cartridge length.

[0052] In optional variants of the implementations described, the heating element includes a first end and a second end, and the first end and the second end of the metal sheet meet at a joint location. Optionally the heating element includes a metal sheet having the first end and the second end.

[0053] In optional variants of the implementations described, the first end and the second end of the metal sheet are glued together at the joint location, welded together at the joint location, and/or mechanically interlocked together at the joint location.

[0054] In optional variants of the implementations described, the heating element has opposing long sides that are offset from each other along the cartridge depth and opposing short sides that are offset from each other along the cartridge width, the perimeter of the heating element includes the long sides and the short sides, and the perimeter of the heating element defines a non-cylindrical cross-section of the heating element that is perpendicular to the cartridge length.

[0055] In optional variants of the implementations described, the joint location is disposed at one of the opposing short sides.

[0056] In optional variants of the implementations described, the heating element has opposing long sides that are offset from each other along the cartridge depth and opposing short sides that are offset from each other along the cartridge width, the perimeter of the heating element includes the long sides and the short sides, and the perimeter of the heating element defines a non-cylindrical cross-section of the heating element that is perpendicular to the cartridge length.

[0057] In optional variants of the implementations described, the heating element is in physical contact with the vaporizable material.

[0058] In optional variants of the implementations described, the heating element is wrapped around, pressed into thermal contact with, and/or arranged to deliver heat directly to the vaporizable material to generate the vapor.

[0059] In optional variants of the implementations described, the cartridge further includes a layer of material or wrapper surrounding at least part of the heater portion and at least part of the mouthpiece portion, the layer of material or wrapper connecting the heater portion with the mouthpiece portion.

[0060] In optional variants of the implementations described, the vaporizable material includes tobacco and a humectant. The humectant can include vegetable glycerin, and the vaporizable material includes 30-50% vegetable glycerin by dry weight. The tobacco can include dried tobacco leaves and dried tobacco stems.

[0061] In optional variants of the implementations described, the tobacco is separate from the humectant. The tobacco can occupy a first volume and the humectant can occupy a second volume, with the first volume being greater (larger volume) than the second volume. The first volume and the second volume can be approximately the same dimensions, the first volume can be smaller than the second volume, and/or the second volume can surround the first volume.

[0062] In optional variants of the implementations described, an interior portion of the cartridge is sprayed with the humectant.

[0063] In optional variants of the implementations described, the heating element includes a susceptor configured to absorb and convert magnetic and/or electromagnetic energy to generate heat.

[0064] In optional variants of the implementations described, the susceptor includes aluminum, an aluminum alloy, or invar. In optional variants of the implementations described, the susceptor includes stainless steel.

[0065] In optional variants of the implementations described, the susceptor includes a non-ferritic and/or non-magnetically permeable material, and the susceptor is configured to generate the heat based (e.g., primarily or entirely) on eddy currents. Optionally the susceptor is not configured to generate the heat based on hysteresis. In optional variants of the implementations described, the susceptor includes a ferritic material, and the susceptor is configured to generate the heat based (e.g., primarily or entirely) on hysteresis.

[0066] In optional variants of the implementations described, the heating element includes a paper-backed metal material. In optional variants of the implementations described, the paper-backed metal material includes a meal layer disposed interior to one paper layer or disposed between two paper layers.

[0067] In optional variants of the implementations described, the external air includes ambient air passing along an airflow inlet path. Optionally the airflow inlet path includes a path configured to allow for passage of the ambient air from outside of the vaporizer device, along an exterior surface of the cartridge, and into the cartridge through the one or more cartridge inlets.

[0068] In various implementations, a method for assembling a cartridge includes forming a heater portion and forming a mouthpiece portion. The heater portion can be formed to include a vaporizable material, a heating element configured to heat the vaporizable material to generate a vapor, and one or more cartridge inlets. The heating element can define at least a portion of a perimeter of a heater chamber containing the vaporizable material. The one or more cartridge inlets are configured to allow external air to enter the heater chamber and entrain the vapor. The mouthpiece portion can be formed to include, at least one vapor inlet, one or more airflow outlet channels in fluid communication with the heater chamber through the at least one vapor inlet, and at least one airflow outlet configured to deliver the inhalable aerosol to a user. The mouthpiece portion can further include at least one bypass air inlet. The one or more airflow outlet channels can be in fluid communication with ambient air through the at least one bypass air inlet. The one or more airflow outlet channels includes at least one condensation chamber configured to condense the entrained vapor (e.g., with the ambient air) to form at least a portion of the inhalable aerosol. The at least one airflow outlet is in fluid communication with the at least one condensation chamber.

[0069] In optional variants of the implementations described, the mouthpiece portion includes an insert and each of the at least one vapor inlet, the at least one bypass air inlet, and the one or more airflow outlet channels are laser cut through the insert. The one or more airflow outlet channels can originate at the at least one vapor inlet and terminate at the at least one airflow outlet.

[0070] In optional variants of the implementations described, the heating element is wrapped around, pressed into thermal contact with, and/or arranged to deliver heat directly to the vaporizable material to generate the vapor.

[0071] In optional variants of the implementations described, the method further includes wrapping a layer of material or wrapper around at least part of the heater portion and at least part of the mouthpiece portion, the layer of material or wrapper connecting the heater portion with the mouthpiece portion.

[0072] In optional variants of the implementations described, the method further includes forming a divider portion. The divider portion can include a divider defining at least a portion of the one or more airflow outlet channels. The mouthpiece portion can further include walls further defining at least a portion of the one or more airflow outlet channels.

[0073] In optional variants of the implementations described, the method further includes forming the vaporizable material. Forming the vaporizable material can include (a) mixing tobacco and a first amount of vegetable glycerin to form a first mixture, (b) forming a shape from the first mixture, (c) adding the shape into the heater portion, and/or (d) adding a second amount of vegetable glycerin to the shape while the shape is disposed within the heater portion. In optional variants of the implementations described, the formed vaporizable material includes 30-50% vegetable glycerin by dry weight.

[0074] In optional variants of the implementations described, the heating element includes a first end and a second end, and the first end and the second end of the metal sheet meet at a joint location. Optionally the heating element includes a metal sheet having the first end and the second end.

[0075] In optional variants of the implementations described, the heating element has opposing long sides that are offset from each other along the cartridge depth and opposing short sides that are offset from each other along the cartridge width, the perimeter of the heating element includes the long sides and the short sides, and the perimeter of the heating element defines a non-cylindrical cross-section of the heating element that is perpendicular to the cartridge length. Optionally the joint location is disposed at one of the opposing short sides.

[0076] In various implementations, a vaporizer device for generating an inhalable aerosol includes a cartridge and a device body. The device body includes a receptacle configured to insertably receive the cartridge. The cartridge can be any one of the cartridges described herein (e.g., above and below, within this summary section).

[0077] In optional variants of the implementations described, the vaporizer device further includes one or more device inlets configured to allow external air to enter the receptacle.

[0078] In optional variants of the implementations described, the receptacle includes ridges configured to couple to the cartridge when the cartridge is insertably received within the receptacle, and the one or more device inlets are formed through the plurality of ridges.

[0079] In optional variants of the implementations described, the ridges include a first plurality of ridges configured to couple to the cartridge proximate a distal end of the cartridge, and the ridges include a second plurality of ridges configured to couple to the cartridge away from the distal end of the cartridge.

[0080] In optional variants of the implementations described, the ridges include a first plurality of ridges configured to couple to the heater portion of the cartridge, and the ridges include a second plurality of ridges configured to couple to the mouthpiece portion of the cartridge.

[0081] In optional variants of the implementations described, the receptacle is configured to insertably receive the cartridge at a distal end of the cartridge, and a proximal end of the cartridge remains outside of the receptacle when the distal end of the cartridge is received in the receptacle.

[0082] In optional variants of the implementations described, the receptacle is configured to insertably receive the heater portion of the cartridge, and the mouthpiece portion of the cartridge remains outside of the receptacle when the heater portion of the cartridge is received in the receptacle.

[0083] In optional variants of the implementations described, the receptacle is configured to insertably receive and couple to the cartridge via a snap-fit, press-fit, friction fit, or magnetic attachment.

[0084] In optional variants of the implementations described, the device body includes the heating element configured to heat the vaporizable material to generate the vapor, the cartridge includes, instead of the heating element, a metal configured to provide the heat to the vaporizable material, and the metal instead defines at least the portion of the perimeter of the heater chamber containing the vaporizable material.

[0085] In various implementations, a vaporizer device for generating an inhalable aerosol includes a heating element configured to heat a vaporizable material to generate a vapor, at least one inductive coil configured to generate a magnetic and/or electromagnetic field to heat the heating element, and a controller. The controller can be configured to apply power to the at least one inductive coil to generate the magnetic and/or electromagnetic field, derive an inductance and a resistance of the at least one inductive coil, and adjust the power applied to the at least one inductive coil based on the derived inductance and resistance of the at least one inductive coil.

[0086] In optional variants of the implementations described, the controller is further configured to estimate a temperature of the heating element based on the derived inductance and resistance of the at least one inductive coil, and adjusting the power applied to the at least one inductive coil is based on the estimated temperature of the heating element.

[0087] In optional variants of the implementations described, the controller is further configured to select an operating temperature for the heating element, and adjusting the power applied to the at least one inductive coil is further based on the operating temperature of the heating element.

[0088] In optional variants of the implementations described, estimating the temperature of the heating element includes measuring a first inductance and a first resistance of the at least one inductive coil during a first time period, measuring a second inductance and a second resistance of the at least one inductive coil during a second time period, comparing the first inductance with the second inductance to determine an inductance difference, comparing the first resistance with the second resistance to determine a resistance difference, and/or comparing the inductance difference and the resistance difference.

[0089] In optional variants of the implementations described, comparing the inductance difference and the resistance difference includes dividing the resistance difference by the inductance difference.

[0090] In optional variants of the implementations described, estimating the temperature of the heating element is based on a temperature coefficient of resistivity of the heating element.

[0091] In optional variants of the implementations described, the first time period is a time period during which the at least one inductive coil is not generating the magnetic and/or electromagnetic field to heat the heating element.

[0092] In optional variants of the implementations described, the second time period is a time period during which the at least one inductive coil is not generating the magnetic and/or electromagnetic field to heat the heating element.

[0093] In optional variants of the implementations described, the second time period is a time period during which the at least one inductive coil is generating the magnetic and/or electromagnetic field to heat the heating element.

[0094] In optional variants of the implementations described, the vaporizer device includes at least one sense coil configured to sense the inductance and resistance of the at least one inductive coil and/or an inductance and a resistance of the heating element, and the sense coil is disposed proximate the at least one inductive coil and/or the heating element.

[0095] In optional variants of the implementations described, the controller is further configured to apply a voltage to the at least one sense coil during the first time period and during the second time period, and the first inductance, the first resistance, the second inductance, and the second resistance are derived based on the applied voltage. Optionally the applied voltage is a direct current (DC) voltage.

[0096] In optional variants of the implementations described, the controller is further configured to apply a voltage to the at least one inductive coil during the first time period and during the second time period, and the first inductance, the first resistance, the second inductance, and the second resistance are derived based on the applied voltage. Optionally the applied voltage is a direct current (DC) voltage.

[0097] In optional variants of the implementations described, adjusting the power applied to the at least one inductive coil includes: adjusting a duty cycle of the power applied to the at least one inductive coil, adjusting a voltage of the power applied to the at least one inductive coil, and/or adjusting a frequency of the power applied to the at least one inductive coil.

[0098] In optional variants of the implementations described, adjusting the power applied to the at least one inductive coil includes adjusting a duty cycle of the power applied to the at least one inductive coil, and the duty cycle includes a time period, for each cycle of the duty cycle, during which the power is not applied to the at least one inductive coil to heat the heating element and the inductance and resistance of the at least one inductive coil are derived.

[0099] In optional variants of the implementations described, the power applied to the at least one inductive coil includes an alternating current (AC) voltage applied to heat the heating element via the magnetic and/or electromagnetic field.

[0100] In optional variants of the implementations described, the at least one inductive coil includes a plurality of inductive coils configured to generate respective magnetic and/or electromagnetic fields, the controller is configured to independently apply and adjust power applied to each of the at plurality of inductive coils, and the controller is further configured to derive a respective inductance and a respective resistance of each of the plurality of inductive coils. Optionally, the adjusting of power applied to each of the plurality of inductive coils is independently based on the respective inductance and resistance of each of the plurality of inductive coils.

[0101] In optional variants of the implementations described, the plurality of inductive coils includes two, three, four, or more inductive coils. Optionally each of the plurality of inductive coils are configured to heat different regions of the heating element.

[0102] In optional variants of the implementations described, the vaporizer device includes one or more flux concentrators configured to direct energy generated by the at least one inductive coil towards the heating element, and the one or more flux concentrators at least partially surround the at least one inductive coil.

[0103] In optional variants of the implementations described, the vaporizer device includes at least one temperature sensor configured to measure a temperature of the at least one inductive coil, and adjusting the power applied to the at least one inductive coil is based on the measured temperature of the heating element. Optionally the at least one temperature sensor is in close proximity to the at least one inductive coil.

[0104] In optional variants of the implementations described, the at least one temperature sensor includes a thermistor, a positive temperature coefficient (PTC) circuit, a negative temperature coefficient (NTC) circuit, and/or a thermocouple.

[0105] In optional variants of the implementations described, the controller is further configured to operate each of the at least one inductive coil at an operating frequency, and the operating frequency is the same or different for each of the at least one inductive coil.

[0106] In optional variants of the implementations described, the controller is further configured to operate each of the at least one inductive coil at a first operating frequency when applying power to heat the heating element, and to operate each of the at least one inductive coil at a second operating frequency when applying power to derive the inductance and resistance of the at least one inductive coil, and the first operating frequency is the same or different than the second operating frequency.

[0107] In optional variants of the implementations described, the controller is further configured to operate one or more of the at least one inductive coil according to the calibration mode to: heat the at least one inductive coil; measure inductance and resistance measurements of the at least one inductive coil as it cools; and store the inductance and resistance measurements in a look up table. Optionally the controller is further configured to adjust the power applied to the at least one inductive coil based on comparison to the inductance and resistance measurements stored in the look up table.

[0108] In optional variants of the implementations described, the heating element includes aluminum, and optionally the heating element is wrapped at least in part around an exterior perimeter of the vaporizable material and configured to heat exterior perimeter of the vaporizable material.

[0109] In optional variants of the implementations described, the heating element includes a non-ferritic and/or non-magnetically permeable material, and the heating element is configured to generate the heat based on eddy currents. Optionally the heating element is not configured to generate the heat based on hysteresis.

[0110] In optional variants of the implementations described, the vaporizer device includes sensing circuitry coupled to electrical leads of the at least one inductive coil, the sensing circuitry configured to measure the inductance and resistance of the at least one inductive coil, and the controller is configured to derive the inductance and resistance of the at least one inductive coil based on the

[0111] In optional variants of the implementations described, the controller is further configured to detect presence of the heating element via the at least one inductive coil.

[0112] In optional variants of the implementations described, the controller is further configured to determine whether the heating element is valid, and enable heating of the heating element after determining the heating element is valid.

[0113] In optional variants of the implementations described, the controller is further configured to determine whether the heating element is deformed, and adjust properties of the generation of the magnetic and/or electromagnetic field when the heating element is deformed.

[0114] In optional variants of the implementations described, the controller is further configured to determine a position of the heating element, and adjust properties of the generation of the magnetic and/or electromagnetic field based on the position of the heating element.

[0115] In optional variants of the implementations described, the vaporizer device includes a cartridge including the heating element, and a device body including a receptacle configured to insertably receive the cartridge, and the at least one inductive coil. In optional variants of the implementations described, the cartridge can be any one of the cartridges described herein (e.g., described above or below, within this summary section).

[0116] In optional variants of the implementations described, the cartridge has a distal end and a proximal end opposite the distal end, a cartridge length between the distal end and the proximal end of the cartridge, a cartridge depth that is transverse to the cartridge length, and a cartridge width that is transverse to the both the cartridge length and the cartridge depth, the cartridge width is longer than the cartridge depth, the cartridge has opposing long sides that are offset from each other along the cartridge depth and opposing short sides that are offset from each other along the cartridge width, a perimeter of the cartridge includes the long sides and the short sides, and the perimeter of the cartridge defines a non-cylindrical cross-section of the cartridge that is perpendicular to the cartridge length.

[0117] In optional variants of the implementations described, the at least one inductive coil includes a first inductive coil proximate a first side of the receptacle and a second inductive coil proximate a second side of the receptacle that is opposite the first side, and the first side of the receptacle and the second side of the receptacle are each proximate one of the opposing long sides of the cartridge when the cartridge is insertably received within the receptacle.

[0118] In optional variants of the implementations described, the vaporizer device includes a first flux concentrator proximate the first inductive coil, the first flux concentrator configured to direct energy generated by the first inductive coil towards the receptacle, and a second flux concentrator proximate the second inductive coil, the second flux concentrator configured to direct energy generated by the second inductive coil towards the receptacle.

[0119] In optional variants of the implementations described, the at least one inductive coil includes a first plurality of inductive coils proximate a first side of the receptacle and a second plurality of inductive coils proximate the second side of the receptacle that is opposite the first side, and the first side of the receptacle and the second side of the receptacle are each proximate one of the opposing long sides of the cartridge when the cartridge is insertably received within the receptacle.

[0120] In optional variants of the implementations described, the vaporizer device includes a first flux concentrator proximate the first plurality of inductive coils, the first flux concentrator configured to direct energy generated by the first plurality of inductive coils towards the receptacle, and a second flux concentrator proximate the second plurality of inductive coils, the second flux concentrator configured to direct energy generated by the second plurality of inductive coils towards the receptacle.

[0121] In optional variants of the implementations described, each of the first plurality of inductive coils are disposed to generate a magnetic and/or electromagnetic field to heat one of the opposing long sides of the cartridge when the cartridge is insertably received within the receptacle, and the second plurality of inductive coils are disposed to generate a magnetic and/or electromagnetic field to heat the other of the opposing long sides of the cartridge when the cartridge is insertably received within the receptacle.

[0122] In optional variants of the implementations described, the controller is further configured to operate each of the at least one inductive coil at one or more operating frequencies.

[0123] In optional variants of the implementations described, the controller is further configured to operate each of the at least one inductive coil according to a normal power mode, a boost power mode, a measurement mode, a cartridge detection mode, a pre-heating mode, a standby mode, and/or a calibration mode.

[0124] In optional variants of the implementations described, the controller is further configured to operate one or more of the at least one inductive coil according to the normal power mode in a frequency range of 100 kHz to 200 kHz or 250 kHz to 350 kHz.

[0125] In optional variants of the implementations described, the controller is further configured to operate one or more of the at least one inductive coil according to the boost power mode in a frequency range greater than 200 kHz and less than 500 kHz, or greater than 350 kHz and less than 500 kHz.

[0126] In optional variants of the implementations described, the controller is further configured to operate one or more of the at least one inductive coil according to the measurement mode to take inductance and resistance measurements of the at least one inductive coil.

[0127] In optional variants of the implementations described, the controller is further configured to operate one or more of the at least one inductive coil according to the cartridge detection mode to determine whether the cartridge is properly insertably received within the receptacle.

[0128] In optional variants of the implementations described, the controller is further configured to operate one or more of the at least one inductive coil according to the pre-heating mode to drive off water vapor in the cartridge.

[0129] In optional variants of the implementations described, the controller is further configured to operate one or more of the at least one inductive coil according to the calibration mode to: heat the at least one inductive coil; measure inductance and resistance measurements of the at least one inductive coil as it cools; and store the inductance and resistance measurements in a look up table.

[0130] In optional variants of the implementations described, the controller is further configured to estimate the temperature of the at least one inductive coil via comparison to the inductance and resistance measurements stored in the look up table.

[0131] In optional variants of the implementations described, the at least one inductive coil includes Litz wire.

[0132] In various implementations, a device for generating an inhalable aerosol includes a cartridge and a device body. The cartridge includes a vaporizable material, a heater chamber, a heating element configured to heat the vaporizable material to generate a vapor, one or more cartridge inlets configured to allow external air to enter the heater chamber and entrain the vapor, one or more airflow outlet channels in fluid communication with the heater chamber, and at least one airflow outlet configured to deliver the inhalable aerosol to a user. The heating element can include a susceptor. The one or more airflow outlet channels can include at least one condensation chamber configured to condense the entrained vapor with ambient air to form at least a portion of the inhalable aerosol. The at least one airflow outlet can be in fluid communication with the at least one condensation chamber. The device body includes a receptacle configured to insertably receive the cartridge and circuitry configured to control heating of the heating element. The circuitry can include at least one inductive coil configured to generate a magnetic and/or electromagnetic field.

[0133] In optional variants of the implementations described, the heating element defines at least a portion of a perimeter of the heater chamber, and the heater chamber includes the vaporizable material.

[0134] In optional variants of the implementations described, the device further includes at least one bypass air inlet, and one or more airflow outlet channels in fluid communication with the heater chamber through the at least one vapor inlet. The one or more airflow outlet channels are in fluid communication with ambient air through the least one bypass air inlet.

[0135] In optional variants of the implementations described, the cartridge can be any one of the cartridges described herein (e.g., described above within this summary section). In optional variants of the implementations described, the receptacle can be any one of the receptacles described herein (e.g., described above within this summary section). In optional variants of the implementations described, the at least one inductive coil can be any one of the inductive coils described herein (e.g., described above within this summary section). In optional variants of the implementations described, the circuitry can include any of the circuitry described herein, such as the various controllers described herein (e.g., described above within this summary section).

[0136] In various implementations, a method for generating an inhalable aerosol includes operating the vaporizer device in accordance with any of the methods of operation described herein. Other vaporizer devices configured to generate an inhalable aerosol, device bodies cartridge, methods for assembling device bodies, methods for assembling cartridge bodies, methods for generating an inhalable aerosol, and/or the like are described herein.

[0137] The details of one or more variations of the subject matter described herein are set forth in the accompanying drawings and the description below. Other features and advantages of the subject matter described herein will be apparent from the description and drawings, and from the claims. The claims that follow this disclosure are intended to define the scope of the protected subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0138] The accompanying drawings, which are incorporated in and constitute a part of this specification, show certain aspects of the subject matter disclosed herein and, together with the description, help explain some of the principles associated with the disclosed implementations. The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application with color drawing(s) will be provided by the Office upon request and payment of the necessary fee. In the drawings:

[0139] FIG. **1**A illustrates a block diagram of a vaporizer device, consistent with implementations of the current subject matter;

[0140] FIG. **1**B illustrates a block diagram of a vaporizer device, consistent with implementations of the current subject matter;

[0141] FIG. **1**C illustrates a block diagram of a vaporizer device, consistent with implementations of the current subject matter;

[0142] FIG. **2** illustrates a front perspective view of an implementation of a vaporizer device, consistent with implementations of the current subject matter;

[0143] FIG. **3** illustrates a front perspective exploded view of an implementation of a cartridge for use with a vaporizer device, consistent with implementations of the current subject matter;

[0144] FIG. **4**A illustrates a cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0145] FIG. **4**B illustrates a front cross-sectional view of the vaporizer device of FIG. **4**A, consistent with implementations of the current subject matter;

[0146] FIG. **4**C illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0147] FIG. **4**D illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0148] FIG. **4**E illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0149] FIG. **4**F illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0150] FIG. **4**G illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0151] FIG. **4**H illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0152] FIG. **4**I illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0153] FIG. **4**J illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0154] FIG. **4**K illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0155] FIG. **4**L illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0156] FIG. **4**M illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0157] FIG. **4**N illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0158] FIG. **4**O illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0159] FIG. **4**P illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0160] FIG. **4**Q illustrates a front cross-sectional view of a vaporizer device, consistent with implementations of the current subject matter;

[0161] FIG. **5**A illustrates a front perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0162] FIG. **5**B illustrates a front perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0163] FIG. **5**C illustrates a front perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0164] FIG. **5**D illustrates a front perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0165] FIG. **5**E illustrates a front perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0166] FIG. **5**F illustrates a front view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0167] FIG. **5**G illustrates a side cross-sectional view taken across line B-B of the holder assembly in FIG. **5**F;

[0168] FIG. **5**H illustrates a top view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0169] FIG. **5**I illustrates a side cross-sectional view taken across line C-C of the holder assembly in FIG. **5**H;

[0170] FIG. **5**J illustrates a side cross-sectional view taken across line C-C of the holder assembly in FIG. **5**H;

[0171] FIG. **6**A illustrates a front cross-sectional perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0172] FIG. **6**B illustrates a front cross-sectional perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0173] FIG. **6**C illustrates a front cross-sectional perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0174] FIG. **6**D illustrates a front cross-sectional perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0175] FIG. **6**E illustrates a front cross-sectional perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0176] FIG. **6**F illustrates a front cross-sectional perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0177] FIG. **6**G illustrates a front cross-sectional perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0178] FIG. **6**H illustrates a front cross-sectional perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0179] FIG. **6**I illustrates a front perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0180] FIG. **6**J illustrates a side perspective and cross-sectional views of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0181] FIG. **7**A illustrates a perspective view of vaporizable material for use in a vaporizer cartridge, consistent with implementations of the current subject matter;

[0182] FIG. **7**B illustrates a perspective view of a heater for use in a vaporizer cartridge, consistent with implementations of the current subject matter;

[0183] FIG. **7**C illustrates a perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0184] FIG. **7**D illustrates a perspective view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0185] FIG. **7**E illustrates a perspective exploded view of a vaporizer cartridge, consistent with implementations of the current subject matter;

[0186] FIG. **8**A illustrates an exemplary cross-section of a cartridge and/or receptacle of a vaporizer device, consistent with implementations of the current subject matter;

[0187] FIG. **8**B illustrates an exemplary cross-section of a cartridge and/or receptacle of a vaporizer device, consistent with implementations of the current subject matter;

[0188] FIG. **8**C illustrates an exemplary cross-section of a cartridge and/or receptacle of a vaporizer device, consistent with implementations of the current subject matter;

[0189] FIG. **8**D illustrates an exemplary cross-section of a cartridge and/or receptacle of a vaporizer device, consistent with implementations of the current subject matter;

[0190] FIG. **8**E illustrates an exemplary cross-section of a cartridge and/or receptacle of a vaporizer device, consistent with implementations of the current subject matter;

[0191] FIG. **8**F illustrates an exemplary cross-section of a cartridge and/or receptacle of a vaporizer device, consistent with implementations of the current subject matter;

[0192] FIG. **9**A illustrates circuitry of a vaporizer device, consistent with implementations of the current subject matter;

[0193] FIG. **9**B illustrates circuitry of a vaporizer device, consistent with implementations of the current subject matter;

[0194] FIG. **9**C illustrates circuitry of a vaporizer device, consistent with implementations of the current subject matter;

[0195] FIG. **9**D illustrates circuitry of a vaporizer device, consistent with implementations of the current subject matter;

[0196] FIG. **9**E illustrates circuitry of a vaporizer device, consistent with implementations of the current subject matter;

[0197] FIG. **10**A illustrates a side perspective view of a vaporizer device, consistent with implementations of the current subject matter;

[0198] FIG. **10**B illustrates a side perspective view of a vaporizer device, consistent with implementations of the current subject matter;

[0199] FIG. **10**C illustrates a side perspective view of a vaporizer device, consistent with implementations of the current subject matter;

[0200] FIG. **10**D illustrates a side perspective view of a vaporizer device, consistent with implementations of the current subject matter;

[0201] FIG. **11**A illustrates a side perspective view of a cartridge and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0202] FIG. **11**B illustrates a side perspective view of a cartridge and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0203] FIG. **11**C illustrates a side perspective view of a cartridge and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0204] FIG. **11**D illustrates a side perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0205] FIG. **11**E illustrates a side perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0206] FIG. **11**F illustrates a bottom perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0207] FIG. **11**G illustrates a side perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0208] FIG. **11**H illustrates a top perspective view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0209] FIG. **11**I illustrates a cross-sectional view of a holder assembly for use in a vaporizer device, consistent with implementations of the current subject matter;

[0210] FIG. **12**A illustrates a side perspective view of a cartridge and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0211] FIG. **12**B illustrates a side perspective view of a cartridge and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0212] FIG. **12**C illustrates a side perspective view of a cartridge and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0213] FIG. **12**D illustrates a side perspective view of a cartridge and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0214] FIG. **12**E illustrates a side perspective view of a cartridge and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0215] FIG. **13**A illustrates a block diagram of a heating element and inductor for use in a vaporizer device, consistent with implementations of the current subject matter;

[0216] FIG. **13**B illustrates a block diagram of a heating element and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0217] FIG. **13**C illustrates a block diagram of a heating element and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0218] FIG. **13**D illustrates a block diagram of a heating element and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0219] FIG. **13**E illustrates a block diagram of a heating element and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0220] FIG. **13**F illustrates a block diagram of a heating element and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0221] FIG. **13**G illustrates a block diagram of a heating element and inductors for use in a vaporizer device, consistent with implementations of the current subject matter;

[0222] FIG. **14**A illustrates a perspective view and corresponding top view of a heating element and inductor for use in a vaporizer device, consistent with implementations of the current subject matter;

[0223] FIG. **14**B illustrates a perspective view and corresponding top view of a heating element and inductor for use in a vaporizer device, consistent with implementations of the current subject matter;

[0224] FIG. **14**C illustrates a perspective view and corresponding top view of a heating element and inductor for use in a vaporizer device, consistent with implementations of the current subject matter;

[0225] FIG. **15**A illustrates a perspective view of a heating element for use in a vaporizer device, consistent with implementations of the current subject matter;

[0226] FIG. **15**B illustrates a perspective view of a heating element for use in a vaporizer device, consistent with implementations of the current subject matter;

[0227] FIG. **15**C illustrates a perspective view of a heating element for use in a vaporizer device, consistent with implementations of the current subject matter;

[0228] FIG. **15**D illustrates a perspective view of a heating element for use in a vaporizer device, consistent with implementations of the current subject matter;

[0229] FIG. **15**E illustrates a perspective view of a heating element for use in a vaporizer device, consistent with implementations of the current subject matter;

[0230] FIG. **16**A illustrates a cross-sectional view of a cartridge and vaporizer body for use in a vaporizer device, consistent with implementations of the current subject matter;

[0231] FIG. **16**B illustrates a cross-sectional view of a cartridge and vaporizer body for use in a vaporizer device, consistent with implementations of the current subject matter;

[0232] FIG. **17**A illustrates a block diagram of vaporizable material for use in a vaporizer device, consistent with implementations of the current subject matter;

[0233] FIG. **17**B illustrates a block diagram of vaporizable material for use in a vaporizer device, consistent with implementations of the current subject matter;

[0234] FIG. **17**C illustrates a block diagram of vaporizable material for use in a vaporizer device, consistent with implementations of the current subject matter;

[0235] FIG. **17**D illustrates a block diagram of vaporizable material for use in a vaporizer device, consistent with implementations of the current subject matter;

[0236] FIG. **17**E illustrates a block diagram of vaporizable material for use in a vaporizer device, consistent with implementations of the current subject matter;

[0237] FIG. **17**F illustrates a block diagram of vaporizable material for use in a vaporizer device, consistent with implementations of the current subject matter;

[0238] FIG. **17**G illustrates a block diagram of vaporizable material for use in a vaporizer device, consistent with implementations of the current subject matter; and

[0239] FIG. **17**H illustrates a block diagram of vaporizable material for use in a vaporizer device, consistent with implementations of the current subject matter.

[0240] When practical, similar reference numbers denote similar structures, features, or elements.

DETAILED DESCRIPTION

[0241] Implementations of the current subject matter include methods, apparatuses, articles of manufacture, and systems relating to vaporization of one or more materials for inhalation by a user. For example, various implementations of vaporizer devices are described herein that provide a number of benefits, including improved generation of controlled energy transfer to inductively heated vaporizer cartridges. For example, by providing multiple inductors, a singular wrapped susceptor, and/or feedback loops with sensors, localized heat transfer may be controlled over the course of use (e.g., each complete use of a vaporizer cartridge, from start to finish, referred to herein a vaporizing session).

[0242] An additional benefit that may be provided by various implementations of vaporizer devices described herein is improving contact between a heating element and/or heated surface of a heating system and a cartridge containing vaporizable material to ensure efficient and effective thermal transfer between the heating element and vaporizable material. For example, by maintaining intimate contact between the cartridge and the heating element and/or heated surface, thermal losses (e.g., to a surrounding housing of the vaporizer device) may be reduced, and heating efficiency (e.g., per amount of power consumption) may be increased. An additional benefit that may be provided by various implementations of vaporizer devices described herein is increased user satisfaction. For example, in some implementations, the proper mixing of relatively cool air (e.g., ambient temperature air) and heated air containing vaporized material can improve the formation of sub-micron sized aerosol particles, thereby reducing condensation of one or more compounds released during heating of the vaporized material onto internal surfaces (e.g., inhalation tubes and/or mouthpiece components) of the vaporizer device. Such condensates may ultimately be drawn into the mouth of a user in liquid form, thereby leading to unpleasant taste sensations, and are not available for inhalation, thereby reducing an amount of available inhalable product. Accordingly, by ensuring proper mixing and aerosol generation, implementations of the current subject matter can increase user satisfaction.

[0243] In some implementations, the vaporizable material can be placed within a location that is in direct contact with and/or in close proximity to a heating element of a heating system to allow for efficient and effective heat transfer from the heating element to the vaporizable material. In some implementations, a cartridge comprising the heating element and the vaporizable material (e.g., vaporizable material contained within an appropriately configured structure) can be placed within a vaporizer body that is configured to transfer energy to the heating element, such as by one or more inductors and/or completion of an electrical circuit that includes the heating element. In other implementations, a cartridge comprising the vaporizable material (e.g., vaporizable material contained within an appropriately configured structure) can be placed within a vaporization chamber, heater chamber, oven, or the like, in which case the area or volume in the vaporizer body within which a heating element causes heating of at least a portion of a vaporizable material includes an internal area or volume of the cartridge. Characteristics of an appropriately configured structure include being formed at least partially of metal and/or some other material that is durable under heating and that has a sufficient thermal conductivity, one or more openings through which air may enter the cartridge to aid in heating the vaporizable material and/or transfer of the vaporizable material as it is vaporized, one or more openings through which ambient air mixes with the vaporized material to form at least a portion of an inhalable aerosol, conveyance of the inhalable aerosol out of the cartridge, and/or the like. As such, the vaporizer devices, heating systems, cartridges, and vaporizable material described herein can provide more efficient heating of vaporizable material and formation of inhalable aerosol compared to some currently available vaporizer devices. Other benefits are described herein and are within the scope of this disclosure. It will be appreciated that aerosol formation can occur concurrently with (e.g., immediately after) vaporization of the vaporizable material, such as based on air that is present within or near the vaporizable material, and that the provision of ambient air can accelerate the formation of the inhalable aerosol.

[0244] The term "vaporizer device" as used in the following description and claims refers to any of a self-contained apparatus, an apparatus that includes two or more separable parts (e.g., a vaporizer body that includes a battery and other hardware, a cartridge and/or insert that includes a vaporizable material, and/or a mouthpiece (including a mouthpiece portion of the cartridge) configured to deliver an inhalable aerosol to a user), and/or the like. A "vaporizer system," as used herein, can include one or more components, such as a vaporizer device, a charger for charging the vaporizer device, a wired or wireless communication device in communication with the vaporizer device, a remote server in communication with the communication device, and/or the like. Examples of vaporizer devices consistent with implementations of the current subject matter include electronic vaporizers, electronic nicotine delivery systems (ENDS), and/or the like. Such vaporizer devices can be hand-held devices that heat (such as by convection, conduction, radiation, induction, and/or some combination thereof) a vaporizable material to provide an inhalable dose of the material to a user. Vaporizer devices can be regarded as "generating" inhalable aerosols, as they provide the capabilities and/or functionality required to convert vaporizable material into inhalable aerosols (e.g., heat, airflow path(s), condensation chambers, etc.).

[0245] The vaporizable material used with a vaporizer device may optionally be provided within a cartridge (e.g., an insertable and removable part of the vaporizer device that contains the vaporizable material) which can be refillable when empty, or disposable such that a new cartridge containing additional vaporizable material of a same or different type can be used. A vaporizer device can be a cartridge-using vaporizer device, a cartridge-less vaporizer device, or a multi-use vaporizer device capable of use with or without a cartridge. Some cartridge implementations can include a vaporizable material, which can be packed to an appropriate density, as described herein. In some implementations, a vaporizer device can include a compartment (e.g., a receptacle, heater chamber, and/or the like) configured to receive a cartridge directly therein and heat the vaporizable material for forming an inhalable aerosol.

[0246] In some implementations, a vaporizer device can be configured for use with a liquid vaporizable material (for example, a carrier solution in which an active and/or inactive ingredient(s) are suspended or held in solution, or a liquid form of the vaporizable material itself) and/or a non-liquid vaporizable material (e.g., a paste, a wax, a gel, a solid, a plant material, and/or the like). A non-liquid vaporizable material can include a plant material that emits some part of the plant material as the vaporizable material (for example, some part of the plant material remains as waste after the material is vaporized for inhalation by a user) or optionally can be a solid form of the vaporizable material itself, such that all of the solid material can eventually be vaporized for inhalation. A liquid vaporizable material can likewise be capable of being completely vaporized, or can include some portion of the liquid material that remains after all of the material suitable for inhalation has been vaporized.

[0247] Implementations of vaporizable material can be partially made of a non-liquid vaporizable material, such as tobacco (e.g., leaves, stems, and/or the like), other plant substances, and/or other solids such as cotton. In such implementations, the vaporizable material further includes a humectant or other aerosol forming material or carrier, such as propylene glycol, vegetable glycerin, an acid (e.g., organic acid such as benzoic acid, citric acid, etc.), and/or the like. As such, some implementations of the vaporizer device can be configured to use a vaporizable material that is at least partly made of one or more vaporizable materials (e.g., that includes one or more compounds that can be converted to the gas phase when the vaporizable material is heated to a sufficient temperature) for heating and forming an inhalable aerosol, as will be described in greater detail below.

[0248] FIGS. **1A-1C** depict block diagrams illustrating example vaporizer devices **100***a*, **100***b*, **100***c* (collectively referred to as vaporizer device **100**) consistent with implementations of the current subject matter. The vaporizer device **100** can include a power source **112** (for example, a battery, which can be a rechargeable battery), and a controller **104** (for example, a processor, circuitry, etc. capable of executing logic) for controlling delivery of heat from one or more heating elements **142** (collectively referred to as heating element **142**) to cause at least a portion of the vaporizable material **102** (such as a solid, a liquid, a solution, a suspension, a part of an at least partially unprocessed plant material, etc.) of a cartridge **120** to be converted to the gas-phase. The controller **104** can be part of one or more printed circuit boards (PCBs) consistent with certain implementations of the current subject matter.

[0249] After conversion of some amount of one or more compounds present in the vaporizable material **102** to the gas phase, at least some of those gas-phase compounds can condense to form particulate matter in at least a partial local equilibrium with the gas phase as part of an aerosol, which can form some or all of an inhalable dose provided by the vaporizer device **100** during a user's puff or draw on the vaporizer device **100**. It should be appreciated that the interplay between gas and condensed phases in an aerosol generated by a vaporizer device **100** can be complex and dynamic, due to factors such as temperature (e.g., ambient or local at various points within the vaporizer device and/or cartridge), relative humidity, chemistry, vapor pressure of one or more vaporizable compounds, flow conditions in airflow paths (both inside the vaporizer device **100** and in the airways of a human or other animal), and/or mixing of the one or more compounds in the gas phase or in the aerosol phase with other air streams, which can affect one or more physical parameters of an aerosol. In some vaporizer devices, and particularly for vaporizer devices configured for delivery of relatively volatile compounds, the inhalable dose can exist predominantly in the gas phase (for example, formation of condensed phase particles can be very limited).

[0250] The heating element **142** can include one or more of a conductive heater, a radiative heater, inductive heater, and/or a convective heater. One type of heating element **142** is a resistive heating element, which can include a material (such as a metal or alloy, for example a nickel-chromium alloy, or a non-metallic resistor) configured to dissipate electrical power in the form of heat when electrical current is passed through one or more resistive segments of the resistive heating element. Another type of heating element **142** is a susceptor, which can include a material (such as a metal or alloy, for example an aluminum alloy and/or a ferritic material such as a stainless steel alloy) configured to absorb and convert energy into heat when magnetic and/or electromagnetic energy is radiated into one or more segments of the susceptor. In various implementations of the current subject matter, the heating element **142** (e.g., a resistive heating element, a susceptor, and/or the like) is configured to generate heat for converting, to the gas phase, one or more compounds present in the vaporizable material **102** to generate an inhalable dose of the one or more compounds present in the vaporizable material **102**. As described herein, in some implementations, the vaporizable material **102** includes a non-liquid vaporizable material including, for example, a solid-phase material (such as a gel, a wax, or the like) or plant material (e.g., tobacco leaves and/or tobacco stems).

[0251] In some implementations, the heating element **142** can be a part of the cartridge **120** (e.g., part of the disposable part of the vaporizer **100**), as shown in the vaporizer device **100***a* of FIG. **1A**. As illustrated, the cartridge **120** can include a mouthpiece portion **130** that includes one or more inserts **124** (e.g., one or more filters, such as illustrated by way of an example implementation of the insert **124** in FIGS. **1A** and **1B**) and a heater portion **141** that includes vaporizable material **102** and one or more heating elements **142**. In some implementations, the mouthpiece portion **130** can be releasably coupled to a part of the cartridge **120**. In some implementations, the mouthpiece portion **130** can be integrated with the cartridge **120**. In some implementations, the mouthpiece portion **130** can include one or more elements of the cartridge **120** (e.g., airflow pathway, insert, end cap, vaporizable material, etc.), such as described herein.

[0252] In some implementations, the cartridge **120** can include one or more inserts **124**, and each insert **124** can include one or more filters and/or filter material. For example, the one or more inserts **124** can be made of material that is one or both of non-vapor permeable and moisture-resistant (e.g., resists damaging effects of water, at least to some extent). Such material can include one or more of metal, metal alloy, paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic such as polyethylene terephthalate (PET), cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like. In some implementations, at least a part of the insert **124** can be inserted into and/or surrounded by one or more elements, including one or more elements associated with the cartridge **120** and/or vaporizer body **110**. For example, one or more inserts **124** can be positioned adjacent to, in contact with and/or offset (e.g., along the length (as length is used and defined herein) of the cartridge **120**) from one or more of a divider (e.g., divider **454** in FIG. **4**G) and end cap (e.g., end cap **664** in FIG. **6**B), as described herein. In some implementations, at least a part of the insert **124** can be exposed (e.g., not inserted into or surrounded by one or more elements), including an entire length (as length is used and defined herein) of the insert **124** can be exposed.

[0253] In some implementations, the heater portion **141** can optionally include one or more inserts **124**, such as at the end of the vaporizable material **102** (e.g., distal end of the cartridge **120**) to help retain the vaporizable material **102** within the cartridge **120**. The one or more inserts **124** can contain a plurality of openings, such as inlets, channels, and/or outlets. In some implementations, at least a portion of the one or more inserts **124** can be permeable, such that vapor and/or aerosol may pass through the inserts **124**. In some implementations, the heater portion **141** can be releasably coupled to a part of the cartridge **120**. In some implementations, the heater portion **141** can be integrated with the cartridge **120**. In some implementations, the heater portion **141** can include one or more elements of the cartridge **120** (e.g., airflow pathway, insert, vaporizable material, etc.), such as described herein. In some implementations, the heater portion **141** can include more than one separable and/or releasably coupleable parts. For example, one part of the heating portion **141** can be integrated with the cartridge **120** and a second part of the heating portion **141** can be integrated with an element apart from and/or outside of the cartridge **120**, such as integrated with the vaporizer body **110**.

[0254] The mouthpiece portion **130** and the heater portion **141** can be joined together via an outer layer, such as one or more layers of material (e.g., wrappers **122** (as shown by way of example in FIGS. **1**A and **1**B), shells, or other comparable structural material or materials). In some aspects, the heater portion **141** can be regarded as including at least a portion of the cartridge **120** that is insertably received in the receptacle **118** and the mouthpiece portion **130** can be regarded as at least some of a portion of the cartridge **120** that remains outside of the receptacle **118** when the cartridge **120** is insertably received in the receptacle **118**. In some implementations, the receptacle **118** can be configured to insertably receive and couple to the cartridge **120** via a snap-fit, press-fit, friction fit, magnetic attachment, and/or the like. In some implementations, the vaporizer body **110** can include a ledge **121** that at least partially defines an opening into the receptacle **118**. The ledge **121** can include features, such as a chamfered edge, that facilitate placement of the cartridge **120** into the receptacle **118**. As the term is used herein, it is not required that the entirety of the mouthpiece portion **130** be designed for insertion into a user's mouth, only that the mouthpiece portion **130** is at or near the end of the cartridge **120** that is designed for the user to place into their mouth in use.

[0255] The heating element **142** can be wrapped around (at least in part), pressed into thermal contact with, or otherwise arranged to deliver heat directly to the vaporizable material **102** to cause release of one or more compounds into the gas phase. Within the vaporizer body, driving circuitry **143** (as shown in FIG. **1**C) is provided for driving the heating element **142**. For example, the driving circuitry **143** can include two or more electrical contacts (e.g., positioned at least partially within the receptacle **118**) for providing an electrically conductive pathway between the power source **112** of the vaporizer body **110** and the heating element **142** of the cartridge **120**, when the cartridge **120** is insertably received within the receptacle **118**. In other implementations, the driving circuitry **143** can include one or more inductors, such as two or more inductive coils, configured to generate an electromagnetic field directed and positioned to affect the heating element **142**, which can take the form of a susceptor, to cause the susceptor to generate heat.

[0256] In other implementations, the heating element **142** can be a part of the vaporizer body **110** (e.g., part of the durable or reusable part of the vaporizer **100**), as shown in the vaporizer device **100***b* of FIG. **1**B. As illustrated, the cartridge **120** can include a mouthpiece portion **130** that includes one or more inserts **124** and a container portion **123** that includes vaporizable material **102**. The mouthpiece portion **130** and the container portion **123** can be joined together via an outer layer, such as one or more wrappers **122**. The heating element **142** can be wrapped around (at least in part), pressed into thermal contact with, or otherwise arranged to deliver heat to the cartridge **120** containing the vaporizable material **102** to convert the one or more compounds from the vaporizable material **102** to the gas phase for subsequent inhalation by a user in a gas-phase and/or a condensed (for example, aerosol particles or droplets) phase. For example the heating element **142** can be positioned within the receptacle **118** and disposed to directly or indirectly heat the container portion **123** (e.g., by conductive or radiative, or convective heating), which in turn can heat the vaporizable material **102** contained therein. In related implementations, the heating element **142** can be positioned outside of the receptacle **118** and disposed to heat the receptacle **118** itself, so as to create an oven that provides convective and/or conductive heat. In either case, the heating element **142** can be at least partially or substantially wrapped around a perimeter of the receptacle **118**. Such a heating element may be heated by one or more of a variety of mechanisms, such as for example electrical resistance, inductive heating, chemical or combustion-related heating (e.g., by burning or causing oxidation or other exothermic chemical conversion of a fuel material), thermal conduction from another heated element, radiative heating, convection, etc.

[0257] In other implementations, the heating element **142** can be a part of a cartridge **120** containing a liquid vaporizable material **102** in a liquid reservoir **182**, as shown in the vaporizer device **100***c* of FIG. **1**C. As illustrated, the cartridge **120** can include a mouthpiece portion **130** and a shell portion **192** containing a heater portion **141** and a reservoir **182** configured to hold a liquid vaporizable material **102**. The mouthpiece portion **130** and the shell portion **192** can be integrally formed (e.g., manufactured as a single piece) or can be joined together via mechanical coupling means, such as snap fit, press fit, friction fit, adhesive, and/or the like. The heater portion **141** can include a heating element **142** and a wicking material (not shown) configured to transfer the liquid vaporizable material **102** from the reservoir **182** to be in contact with the heating element **142** via capillary action. In some implementations, the heating element **142** can be in direct contact with the wicking material, such as by being pressed against one or more sides of the wicking material, wrapped at least partially around the wicking material, and/or the like. The heating element **142** can be configured to generate heat to convert the one or more compounds from the vaporizable material **102** to the gas phase for subsequent inhalation by a user in a gas-phase and/or a condensed (for example, aerosol particles or droplets) phase. For example, the heater portion **141** can include circuitry configured to receive and/or convert an applied electromagnetic field into an electrical current that is used to power, and thereby heat, the heating element **142**. In some implementations, the heating element **142** itself can be configured to generate heat based on having a structure (e.g., material and shape) configured to receive and convert an applied electromagnetic field into an electrical current that is used to power, and thereby heat, the heating element **142**. Accordingly, the heater portion **141** and/or heating element **142** can be powered via the driving circuitry **143**, as described herein.

[0258] Where the vaporizable material **102** includes a non-liquid vaporizable material, the heating element **142** can be part of, or otherwise incorporated into or in thermal contact with, the walls of a heating chamber or compartment (e.g., receptacle **118**) into which the cartridge **120** and/or the vaporizable material **102** is placed. Additionally or alternatively, the heating element **142** can be used to heat air passing into, through, or past the cartridge **120**, to cause convective heating of the vaporizable material **102** (e.g., within the cartridge **120**). In still other examples, the heating element **142** can be disposed in intimate contact with the vaporizable material **102** such that direct conductive heating of the vaporizable material **102** of the cartridge **120** occurs from within a mass of the vaporizable material **102**, as opposed to only by conduction inward from walls of the heating chamber (e.g., an oven and/or the like). Convective heating of air passing through or past the cartridge **120** may also occur in such configurations. Additionally, conductive heating can occur by means of inductively heating the heating element **142**. That is, the heating element **142** can generate heat based on conversion of electromagnetic energy into heat, and this heat may be conducted to other parts of the cartridge **120**, such as for example other parts of the heating element **142** that are not as directly affected by the electromagnetic energy, the vaporizable material **102**, other thermally conductive parts of the cartridge **120** or the vaporizer body **110**, etc. The vaporizable material **102** may be vaporized by this heat based in part on being in contact with one or more surfaces of the heating element **142** and/or other materials that are conductively heated by the heating element **142**.

[0259] The heating element **142** can provide heat to convert, to the gas phase, one or more compounds present in the vaporizable material **102** in association with a user puffing (e.g., drawing, inhaling, etc.) on a mouthpiece portion **130** and/or end of the vaporizer device **100** to cause air to flow from an air inlet, along an airflow path for assisting with forming an aerosol that can be delivered out through an air outlet in the mouthpiece portion **130** and inhaled by a user. Incoming air moving along the airflow path moves past (e.g., around, over, etc.) and/or through the cartridge **120** and/or vaporizable material **102** where compounds released from the vaporizable material **102** into the gas-phase are entrained into the air. The heating element **142** can be activated via the controller **104**, which can optionally be a part of the vaporizer body **110** as discussed herein, causing current to pass from the power source **112** through a circuit including or otherwise electromagnetically coupled to (e.g., as part of an inductor-susceptor pairing) the heating element **142**, which can be part of the vaporizer body **110**. As noted herein, at least some of the entrained one or more gas-phase compounds can condense while passing through the remainder of the airflow path such that an inhalable dose of the one or more compounds in an aerosol form can be delivered from the air outlet (e.g., via the mouthpiece portion **130**) for inhalation by a user.

[0260] In some implementations, the heating element **142** can be activated in association with a user interacting with the vaporizer device **100**. For example, activation of the heating element **142** can be caused by automatic detection of a puff or other user interaction based on one or more signals generated by one or more sensors **113**. The one or more sensors **113** and/or the signals generated by the one or more sensors **113** can include one or more of: a pressure sensor or sensors disposed to detect pressure along the airflow path of the vaporizer device **100** relative to ambient pressure or optionally to measure changes in absolute pressure; a temperature sensor or sensors, such as a thermistor, a positive temperature coefficient (PTC) circuit such as a PTC thermistor, a negative temperature coefficient (NTC) circuit such as an NTC thermistor, a thermocouple, and/or the like disposed to measure the temperature of the receptacle **118**, the heating element **142**, and/or some other component of the vaporizer body **110** or the cartridge **120**; one or more circuits configured to determine a temperature of the heating element **142**, for example based on measuring or determining a resistance and/or inductance of the heating element **142** via comparison to one or more resistors with a known resistance and/or one or more inductors with a known inductance; a motion sensor or sensors, such as an accelerometer, a gyroscope, or the like, configured to detect movement, vibration, orientation, position, acceleration, etc. of the vaporizer device **100**; a flow sensor or sensors configured to detect a flow rate of air, gas, or liquid within the vaporizer device **100**; a capacitive sensor configured to detect touch, such as of a user's finger(s), palm(s), lip(s), etc. on some part of the vaporizer device **100**; circuitry configured to detect interaction with the vaporizer device **100** via one or more input devices **116**, such as buttons, other tactile control devices, or the like of the vaporizer device **100**; circuitry configured to receive and process signals from a computing device in communication with the vaporizer device **100**; and/or circuitry configured for determining that a puff is occurring or imminent.

[0261] In some implementations, the vaporizer device **100** can be configured to start a heating cycle that can include a period of heating the heating element **142**, receptacle **118**, cartridge **120**, and/or vaporizable material **102** to an operating (e.g., pre-determined) temperature or temperature range (e.g., a temperature or range sufficient to convert, to the gas phase, one or more compounds present in the vaporizable material **102**). Once the heating element **142**, receptacle **118**, cartridge **120**, and/or vaporizable material **102** reach the operating temperature or temperature range, the vaporizer device **100** can be configured to maintain or otherwise regulate the application of heat such that the vaporizable material **102** can be vaporized without burning. In some implementations, additional heat can be provided via the heating element **142** upon detection of an event, such as a user placing their lips on the vaporizer device **100**, the user taking a puff on the vaporizer device **100**, and/or any of the signals (e.g., generated by the one or more sensors **113**) described herein. The heating cycle can terminate upon detection of an additional interaction with the vaporizer device **100** via the one or more input devices **116**, upon determining that a certain amount of time has elapsed since the start of the heating cycle, upon determining that a certain amount of time has elapsed since the last detection of a user puff, upon determining that a cartridge **120** is not present within the receptacle **118**, as a result of other events, actions, detected durations of the same, and/or the like, consistent with implementations described herein.

[0262] As discussed herein, the vaporizer device **100** consistent with implementations of the current subject matter can be configured to connect (e.g., wirelessly or via a wired connection) to a computing device (or optionally two or more devices) in communication with the vaporizer device **100**. To this end, the controller **104** can include communication hardware **105**. The controller **104** can also include a memory **108**. The communication hardware **105** can include firmware and/or can be controlled by software for executing one or more protocols for the communication.

[0263] A computing device can be a component of a vaporizer system that also includes the vaporizer device **100**, and can include its own hardware for communication, which can establish a wireless communication channel with the communication hardware **105** of the vaporizer device **100**. For example, a computing device used as part of a vaporizer system can include a general-purpose computing device (such as a smartphone, a tablet, a personal computer, some other portable device such as a smartwatch, or the like) that executes software to produce a user interface for enabling a user to interact with the vaporizer device **100**. In other implementations of the current subject matter, such computing device used as part of a vaporizer system can be a dedicated piece of hardware such as a remote control or other wireless or wired device having one or more physical or soft (e.g., configurable on a screen or other display device and selectable via user interaction with a touch-sensitive screen or some other input device **116** like a mouse, pointer, trackball, cursor buttons, or the like) interface controls. The vaporizer device **100** can also include one or more outputs **117** or devices for providing information to the user. For example, the outputs **117** can include one or more light emitting diodes (LEDs) configured to provide feedback to a user based on a status and/or mode of operation of the vaporizer device **100**. The one or more LEDs can be single-color LEDs and/or multicolored LEDs (e.g., both may be separately used).

[0264] In the example in which a computing device provides signals related to activation of the heating element **142**, or in other examples of coupling of a computing device with the vaporizer device **100** for implementation of various control or other functions, the computing device executes one or more computer instruction sets to provide a user interface and underlying data handling. In one example, detection by the computing device of user interaction with one or more user interface elements can cause the computing device to signal the vaporizer device **100** to activate the heating element **142** to reach an operating temperature for creation of an inhalable dose of aerosol. Other functions of the vaporizer device **100** can be controlled by interaction of a user with a user interface on a computing device in communication with the vaporizer device **100**.

[0265] The temperature of the heating element **142** of the vaporizer device **100** can depend on a number of factors, including an amount of power or energy delivered to the heating element **142**, a duty cycle at which power or current is delivered, a time during which the power or current is delivered, an efficiency of the heating element **142** converting current to heat, conductive and/or radiative heat transfer to other parts of the vaporizer device **100** and/or to the environment, latent heat losses due to vaporization of the vaporizable material **102**, convective heat losses due to airflow (e.g., air moving across the heating element **142** and/or an area heated by the heating element **142** when a user puffs on the vaporizer device **100**), and/or the like.

[0266] As noted herein, to reliably activate the heating element **142** and/or heat the heating element **142** to a desired temperature, in some implementations of the current subject matter the vaporizer device **100** may make use of signals from the one or more sensors **113**. For example, the one or more sensors **113** can include a pressure sensor, to determine when a user is inhaling. The one or more sensors **113** can optionally be positioned in the airflow path and/or can be connected (for example, by a passageway or other path) to an airflow path containing an airflow inlet for air to enter the vaporizer device **100** and an airflow outlet via which the user inhales the resulting aerosol such that the one or more sensors **113** experiences changes (for example, pressure changes) concurrently with air passing through the vaporizer device **100** from the airflow inlet to the airflow outlet. In some implementations of the current subject matter, the heating element **142** can be activated in association with a user's puff, for example by automatic detection of the puff, or by the one or more sensors **113** detecting a change (such as a pressure change) in the airflow path.

[0267] Additionally or alternatively, to maintain the heating element **142** at a desired temperature, in some implementations of the current subject matter the vaporizer device **100** may make use of other signals from one or more sensors **113**. For example, the one or more sensors **113** can include a capacitive, conductive, and/or electromagnetic sensor, to determine the inductance, resistance, and/or impedance of the heating element **142**. The one or more sensors **113** can optionally be positioned in a location that is in physical contact with the heating element **142** (for example, within the receptacle **118**) or in a location that is sufficiently close to the heating element **142** to measure the variations in an electromagnetic field affecting the heating element (e.g., within, touching, or proximate to at least some part of the receptacle **118**). In some implementations, the one or more sensors **113** can be in electrical communication with an inductor configured to inductively heat the heating element **142** and/or configured to determine the inductance, resistance, and/or impedance of the inductor. Additionally or alternatively, the one or more sensors **113** can include a temperature sensor configured to sense a temperature of the inductor and/or heating element **142**. Based on information derived from the one or more sensors **113**, the controller **104** can be configured to estimate a temperature of the heating element **142**, as described herein. In some implementations, the heating element **142** can be activated in association with an estimated temperature of the heating element **142**, for example by comparison of the detected inductance and/or resistance of the heating element **142** via the one or more sensors **113** with a suitable sensing circuit.

[0268] The one or more sensors **113** can be positioned on or coupled to (e.g., electrically or electronically connected, physically or via a wireless connection) the controller **104** (e.g., a printed circuit board assembly or other type of circuit board). To take measurements accurately and maintain durability of the vaporizer device **100**, it can be beneficial to provide a seal that is sufficiently resilient to separate an airflow path from other parts of the vaporizer device **100**. The seal, which can be a gasket, can be configured to at least partially surround the one or more sensors **113** such that connections of the one or more sensors **113** to the internal circuitry of the vaporizer device **100** are separated from a part of the one or more sensors **113** exposed to the airflow path. Such arrangements of the seal in the vaporizer device **100** can be helpful in mitigating against potentially disruptive impacts on vaporizer components resulting from interactions with environmental factors such as water in the vapor or liquid phases and/or to reduce the escape of air from the designated airflow path in the vaporizer device **100**. Passage of air, liquid, or other fluid passing and/or contacting circuitry of the vaporizer device **100** can cause various unwanted effects, such as altered pressure readings, and/or can result in the buildup of material, such as moisture or residue, errant portions of the vaporizable material **102**, etc., in parts of the vaporizer device **100** where they can result in poor pressure signal, degradation of the one or more sensors **113** or other components, and/or a shorter life of the vaporizer device **100**. Leaks in the seal can also result in a user inhaling air that has passed over parts of the vaporizer device **100** containing, or constructed of, materials that may not be desirable to be inhaled.

[0269] When the one or more sensors **113** includes an electrically conductive surface for measuring the resistance of the heating element **142**, the one or more sensors **113** can additionally or alternatively be positioned on a surface that is biased against some part of the heating element **142**. For example, the one or more sensors **113** can be disposed on a surface of a spring or other resiliently deformable structure, or otherwise biased by a spring or other resiliently deformable structure, such that the one or more sensors **113** remains in physical contact with a surface of the heating element **142**. Such arrangements of a spring or other resiliently deformable structure in the vaporizer device **100** can be helpful in mitigating against potentially disruptive impacts on vaporizer components resulting from interactions with environmental factors such as those described herein.

[0270] In vaporizer devices in which the power source **112** is part of a vaporizer body **110** and the heating element **142** is disposed in the cartridge **120** configured to couple with the vaporizer body **110**, the cartridge **120** and vaporizer device **100** may include electrical connection features (e.g., electrical contacts, conductors, and the like) for completing a physical circuit that includes the controller **104** (e.g., a printed circuit board, a microcontroller, or the like), the power source **112**, and the heating element **142**. The circuit completed by these electrical connections can allow delivery of electrical current to the heating element **142** (e.g., resistive heating element) and may further be used for additional functions, such as measuring a resistance of the heating element **142** for use in determining and/or controlling a temperature of the resistive heating element based on a thermal coefficient of resistivity of the resistive heating element. In some implementations, a different circuit may be provided for measuring a resistance of the heating element **142**, compared to the circuit that allows for delivery of the electrical current to the heating element **142**, such as a circuit that includes one or more sensors **113** and the heating element **142**, as described herein.

[0271] Alternatively, the power source **112** can be part of a vaporizer body **110** and the heating element **142** can be disposed in the cartridge **120** and configured as a susceptor to be electromagnetically coupled with one or more inductor coils that are part of the driving circuitry **143** in the vaporizer body **110**. A physical circuit in the vaporizer body **110** includes the controller **104** (e.g., a printed circuit board, a microcontroller, or the like), the power source **112**, and the one or more inductor coils, which can be or form part of the driving circuitry **143**. The physical circuit delivers electrical current to the one or more inductor coils and may further be used for additional functions, such as measuring an impedance of the heating element **142** for use in determining and/or controlling a temperature of the heating element **142** based on a thermal coefficient of resistivity of the heating element **142**. In some implementations, a different circuit may be provided for measuring impedance of the heating element **142**, compared to the circuit that allows for delivery of the electrical current to the one or more inductor coils, such as a circuit that includes one or more sensors **113** as described herein.

[0272] In some implementations, the receptacle **118** can include all or part of the heating element **142** (e.g., a heating coil, resistive heating element, etc.) that is configured to conductively, radiatively, convectively, etc. heat the cartridge **120** received in the receptacle **118**, such as for forming an aerosol to be inhaled by a user of the vaporizer device **100**. For example, the receptacle **118** can include various implementations of the heating element **142** that are configured to receive and/or be placed in contact with the cartridge **120**. Various implementations of the heating element **142**, the receptacle **118**, and the cartridge **120** are described herein for integration within and/or use with a variety of vaporizer bodies **110** for forming inhalable aerosol.

[0273] In some implementations, the cartridge **120** can be configured for insertion in the receptacle **118**, such as for forming contact between an outer surface of the cartridge **120** and one or more inner walls of the receptacle **118**. In some implementations, the cartridge **120** can have a same or a similar shape as the receptacle **118**. In some implementations, the cartridge **120** can include a square or rectangular shape. In some implementations, the cartridge **120** can include a circular cross-section and/or a cylindrical shape. In some implementations, the cartridge **120** can have a non-circular cross-section transverse to the longitudinal axis along which the cartridge **120** is inserted into the receptacle **118**. The non-circular cross-section(s) of the cartridge **120**

and/or receptacle **118** can include two sets of parallel or approximately parallel opposing sides (e.g., having a parallelogram-like shape), or other shapes, including curved shapes, having rotational symmetry of at least order two. For example, FIGS. **8**A-**8**F illustrate example cross-sections of the cartridge **120** and/or receptacle **118**, including a rectangular shape (FIG. **8**A), a rounded rectangular shape (FIG. **8**B), an elliptical or oval shape (FIG. **8**C), or other shapes that include corners, bends, edges, protrusions, recesses, and/or the like (FIGS. **8**D-**8**F). In this context, approximate shape indicates that a basic likeness to the described shape is apparent, but that sides of the shape in question need not be completely linear and vertices need not be completely sharp. Rounding of both or either of the edges or the vertices of the cross-sectional shape is contemplated in the description of any non-circular cross-section referred to herein.

[0274] In some implementations, at least one of the one or more inner walls forming the receptacle **118** can include the heating element **142** and/or include thermally conductive material. For example, cartridge **120** configurations in which the cartridge **120** forms a sliding fit and/or forms close contact with the receptacle **118** can allow for efficient heat transfer between the heating element **142**, the receptacle **118**, and the cartridge **120**, thereby causing efficient and effective heating of the vaporizable material **102** within the cartridge **120**. In other implementations, at least one of the one or more inner walls forming the receptacle **118** can include ridges that only contact the cartridge **120** in specific locations, in order to minimize conductive heat losses from the cartridge due to physical contact with surfaces of the vaporizer body **110** that are not actively heated. For example, cartridge **120** configurations in which the heater portion **141** (or other thermally conductive parts) of the cartridge **120** only contacts the receptacle **118** in certain regions, such as regions distal to the heating element(s) **142**, can allow for maintaining a higher temperature at the heating element **142**, thereby causing efficient and effective heating of the vaporizable material **102** within the cartridge **120**.

[0275] Furthermore, the cartridge **120** can include compressed and/or higher density configurations of non-liquid vaporizable material **102**, which can further contribute to efficient and effective heating and converting, to the gas phase, one or more compounds present in the vaporizable material **102**. For example, vaporizable material **102** in a compressed and/or high-density configuration can include a minimal amount of air or pockets of air in the vaporizable material **102** thereby increasing the efficiency and effectiveness of transferring heat within the vaporizable material **102**. Such a configuration can allow for reduced power consumption at least because less heating power is needed to effectively heat the vaporizable material **102** to a temperature sufficient to cause release of inhalable substances. Additionally, lower temperatures (e.g., at a contact surface of an oven or heating element) can be used to heat the vaporizable material **102** at least because of the improved heating efficiency of the vaporizable material **102**, which can also reduce power consumption and formation of hazardous byproducts resulting from heating the vaporizable material at higher temperatures. Various implementations of the cartridge **120** are described herein that include the vaporizable material formed in compressed and/or high-density configurations for achieving at least some of the benefits described above.

[0276] In some implementations, the vaporizer device **100** can include a heating system configured to receive and heat the vaporizable material **102** for generating an inhalable aerosol. For example, implementations of the heating system can include one or more heating elements **142** positioned at, against, near, within, outside, and/or along the walls of the receptacle **118** (e.g., extending along at least a portion of the wall(s) at the distal end (e.g., bottom) of the receptacle **118**, extending along at least a portion of each of the distal wall(s) and/or side wall(s) of the receptacle **118**, etc.). In some implementations, the one or more heating elements **142** can be configured to heat one or more of the walls of the receptacle **118** from the outside to the interior of the receptacle **118** (e.g., with the vaporizable material **102** being in the interior of the receptacle **118**). In another example, implementations of the heating system can include one or more heating elements **142** positioned at, against, near, within, outside, and/or along the walls of the cartridge **120** (e.g., extending along at least a portion of the wall(s) at the distal end (e.g., bottom) of the cartridge **120**, extending along at least a portion of each of the distal wall(s) and/or side wall(s) of the cartridge **120**, etc.). In some implementations, the one or more heating elements **142** can form one or more of the walls of the cartridge **120** to heat from the outside to the interior of the cartridge **120** (e.g., with the vaporizable material **102** being in the interior of the cartridge **120** and optionally, in the interior of the heating element **142**).

[0277] The heating system can also include at least one airflow pathway, which can be configured to move heated air through the vaporizable material **102**. As will be described in greater detail below, the heating system can be configured to receive the cartridge **120** and heat the cartridge **120** using at least one heating element **142** to provide an inhalable aerosol via one or more airflow pathways for inhalation by a user.

[0278] Various implementations of such heating systems of vaporizer devices **100** are described herein that provide a number of benefits, including evenly distributing heat through the vaporizable material **102** of the cartridge **120**. This can result in improved inhalable aerosol generation, less energy and/or lower average temperatures required to form inhalable aerosol, and increased user satisfaction with the device use and consumption of the vaporizable material **102**.

[0279] In some implementations, the heating system of the vaporizer device **100** is configured to heat a non-liquid vaporizable material, such as a tobacco-based material. For example, the vaporizer body **110** can include one or more heater portions **141** or containers **123** that each accept and heat vaporizable material **102** via one or more heating elements **142**, thereby generating an inhalable aerosol. In some implementations, the vaporizer device **100** may include one or more airflow pathways that extend through the cartridge **120** positioned within a respective receptacle **118**, and out through a mouthpiece portion **130** to a user.

[0280] In some implementations, the cartridge **120** may include one or more barriers configured to contain vaporizable material **102** and/or hold the components of the cartridge **120** together. The one or more barriers may be provided by the heating element **142** itself, a container **123**, an insert **124**, an outer layer, such as one or more wrappers **122**, and/or the like. The one or more barriers can be made of material that is one or both of non-vapor permeable and moisture-resistant (e.g., resists damaging effects of water, at least to some extent). Such material can include one or more of metal, metal alloy, paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic such as polyethylene terephthalate (PET), cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like.

[0281] In some implementations, use of a metal such as aluminum in the heating element **142** and/or a container **123** may be advantageous where efficient heat transfer (e.g., requiring less energy to spread across a larger region) is required, which can be the case where a singular heat source is provided. In other implementations, a metal such as stainless steel in the heating element **142** and/or a container **123** may be advantageous where efficient heat transfer is of less concern, such as where multiple heat sources are disposed to heat different regions of the cartridge **120**. Containing the vaporizable material **102** within a non-vapor permeable and/or moisture-resistant barrier can protect the receptacle **118** and/or other portions of the vaporizer device **100** from vapor deposits and/or remains of the vaporizable material, such that cleaning of the heating element **142** and/or other portions of the vaporizer device **100** after use may not be required. Stated another way, one or more of the heating element **142**, the container **123**, the insert **124**, and/or the outer layer (e.g., one or more wrappers **122**) may provide a barrier between the vaporizable material **102** and the components of the vaporizer body **110**, with the barrier optionally being non-vapor permeable and/or moisture-resistant.

[0282] The heater **141** of FIG. **1**A and/or the container **123** of FIG. **1**B cartridge **120** can be configured to hold the vaporizable material **102** with a lid, outer layer and/or inner layer(s) (e.g., wrapper(s) **122**), insert **124**, and/or other component configured to retain the vaporizable material **102** therein. Various implementations of a heating system and cartridge **120** are described in greater detail below.

[0283] FIG. **2** illustrates a perspective view of an implementation of a vaporizer device **200**, consistent with implementations of the current subject matter. The vaporizer device **200** can be an implementation of one or more components of the vaporizer device **100** of FIGS. **1**A-**1**B. Separately, any of the structure of functionality described with respect to the vaporizer device **200** of FIG. **2** can be implemented in or by the vaporizer device **100** of FIGS. **1**A-**1**B.

[0284] For example, as illustrated, the vaporizer device **200** can include a vaporizer body **210**, a receptacle **218**, and a ledge **221** outside of the receptacle **218**. As described herein, a cartridge **220** containing vaporizable material **202** (including any implementation of the vaporizer material **102** of FIGS. **1**A-**1**C) can be inserted into the receptacle **218**, and at least a portion of the cartridge **220** can remain outside of the receptacle **218**, such as the mouthpiece portion **230** that can include an airflow outlet **228**. The heater portion **241** of the cartridge **220** can be inserted into and/or at least partially enclosed within the receptacle **218**. Although the mouthpiece portion **230** and the heater portion **241** can be approximately the same size in length (e.g., 1:1) along the cartridge **220** length, other relative sizes are contemplated (e.g., approximately 1:2, 2:3, 3:4, 4:5, 5:4, and/or the like).

[0285] As illustrated, the cartridge **220** can extend from a cartridge proximal end **220*a*** to a cartridge distal end **220*b*** and contain two or more portions, such as a heater portion **241** and a mouthpiece portion **230**. The total distance between the cartridge proximal end **220*a*** and the cartridge distal end **220*b*** can be regarded as the cartridge **220** length, for example, extending along the y-axis as illustrated in FIG. **2** (and as also illustrated in FIG. **3**). Furthermore, any component of the cartridge **220** can be referred to as having a length as referenced by the y-axis in FIG. **2** (and as also illustrated in FIG. **3**).

[0286] As also illustrated, the vaporizer body **210** can extend from a body proximal end **210*a*** to a body distal end **210*b***. The total distance between the body proximal end **210*a*** and the body distal end **210*b*** can be regarded as the vaporizer body **210** length, for example, extending along the y-axis as illustrated in FIG. **2** (and as also illustrated in FIG. **5**A). Furthermore, any component of the vaporizer body **210**, as well as the vaporizer device **200**, can be referred to as having a length as referenced by the y-axis in FIG. **2** (and as also illustrated in FIG. **5**A with respect to components of the vaporizer body **210**).

[0287] The cartridge **220** can be regarded as having two additional dimensions that are transverse to the cartridge **220** length, which are the depth and the width. As referred to herein, the cartridge **220** depth can be the distance between two points on opposing faces (e.g., surface areas, which can be substantially the same size and shape when rotated about a central longitudinal axis) of the exterior of the cartridge **220**, in a dimension that is perpendicular to the cartridge **220** length, for example, extending along the z-axis as illustrated in FIG. **2** (and as also illustrated in FIG. **3**). Furthermore, any component of the cartridge **220** can be referred to as having a depth as referenced by the z-axis in FIG. **2** (and as also illustrated in FIG. **3**). In some aspects, the cartridge **220** depth can be understood as the greatest distance of the cartridge **220** along the z-axis and/or the distance between two opposing points on the exterior of the cartridge **220** (e.g., with the opposing points being opposite each other along an axis that is perpendicular to the center of the cartridge **220** width). As referred to herein, the cartridge **220** width can be the distance between two points on opposing faces of the exterior of the cartridge **220**, in a dimension that is perpendicular to both the cartridge **220** length and the cartridge **220** depth, and is the longer of the two transverse dimensions, for example, extending along the x-axis as illustrated in FIG. **2** (and as also illustrated in FIG. **3**). Furthermore, any component of the cartridge **220** can be referred to as having a width as referenced by the x-axis in FIG. **2** (and as also illustrated in FIG. **3**). In some aspects, the cartridge **220** width can be understood as the greatest distance of the cartridge **220** along the x-axis and/or the distance between two opposing points on the exterior of the cartridge **220** (e.g., with the opposing points being opposite each other along an axis that is perpendicular to the center of the cartridge **220** depth). Accordingly, the axis along which the cartridge **220** width extends can be referred to as the first transverse axis and/or the cartridge long axis, and the axis along which the cartridge **220** depth extends can be referred to as the second transverse axis and/or the cartridge short axis.

[0288] A surface of the cartridge **220** extending primarily along the cartridge **220** width can be referred to as a long side of the cartridge **220** and/or as being on a long side of the cartridge **220**, and a surface of the cartridge **220** extending primarily along the cartridge **220** depth can be referred to as a short side of the cartridge **220** and/or as being on a short side of the cartridge **220**. Each of the referenced surfaces of the cartridge **220** can be a surface area on the exterior of the cartridge **220**. In some aspects, the longer opposing faces can be regarded as being on the long/longer sides of the cartridge **220**, offset along the cartridge **220** depth, and the smaller opposing faces can be regarded as being on the short/shorter sides of the cartridge **220**, offset along the cartridge **220** width. It will be appreciated that this terminology can be applied to any implementation of a cartridge and its subcomponents described herein (e.g., heater portion, mouthpiece portion, layer of material, wrapper, and/or the like), and this terminology is not redefined with respect to each implementation for the sake of brevity.

[0289] The vaporizer body **210** can also be regarded as having two additional dimensions that are transverse to the vaporizer body **210** length, which are the depth and the width. As referred to herein, the vaporizer body **210** depth can be the distance between two points on opposing faces of the exterior of the vaporizer body **210**, in a dimension that is perpendicular to the vaporizer body **210** length, for example, extending along the z-axis as illustrated in FIG. **2** (and as also illustrated in FIG. **5**A). Furthermore, any component of the vaporizer body **210**, as well as the vaporizer device **200**, can be referred to as having a depth as referenced by the z-axis in FIG. **2** (and as also illustrated in FIG. **5**A with respect to components of the vaporizer body **210**). In some aspects, the vaporizer body **210** depth can be understood as the greatest distance of the vaporizer body **210** along the z-axis and/or the distance between two opposing points on the exterior of the vaporizer body **210** (e.g., with the opposing points being opposite each other along an axis that is perpendicular to the center of the vaporizer body **210** width). As referred to herein, the vaporizer body **210** width can be the distance between two points on opposing faces of the exterior of the vaporizer body **210**, in a dimension that is perpendicular to both the vaporizer body **210** length and the vaporizer body **210** depth, and is the longer of the two transverse dimensions, for example, extending along the x-axis as illustrated in FIG. **2** (and as also illustrated in FIG. **5**A). Furthermore, any component of the vaporizer body **210**, as well as the vaporizer device **200**, can be referred to as having a width as referenced by the x-axis in FIG. **2** (and as also illustrated in FIG. **5**A with respect to components of the vaporizer body **210**). In some aspects, the vaporizer body **210** width can be understood as the greatest distance of the vaporizer body **210** along the x-axis and/or the distance between two opposing points on the exterior of the vaporizer body **210** (e.g., with the opposing points being opposite each other along an axis that is perpendicular to the center of the vaporizer body **210** depth). Accordingly, the axis along which the vaporizer body **210** width extends can be referred to as the first transverse axis and/or the vaporizer body long axis, and the axis along which the vaporizer body **210** depth extends can be referred to as the second transverse axis and/or the vaporizer body short axis.

[0290] It will be appreciated that elements described herein (e.g., vaporizer device, cartridge, vaporizer body, and component thereof) can have surfaces defined in Euclidean or non-Euclidean spaces. Dimensions of ends, sides, faces, and/or the like that exist in non-Euclidean spaces can be regarded as dimensions of the referenced ends, sides, faces and/or the like that exist in Euclidean spaces. The distance between any two ends, sides, faces, points, etc. can be equal to the shortest distance between two opposing points at the center of each identified structure, component, region, portion, etc. However, in the event a structure, component, region, portion, etc. is not uniform in shape (e.g., convex or concave ends of a cartridge **220** and/or vaporizer body **210**), the distance can be equal to the longest distance along a plane or volume that intersects the identified ends, sides, points, etc., orthogonal to the identified ends, sides, points, etc.

[0291] The term "heater portion" as used herein can refer to a portion (e.g., region and/or subset of the components) of a cartridge that includes a heating element or is otherwise heated in use. The term "mouthpiece portion" as used herein can refer to a portion (e.g., region and/or subset of the components) of a cartridge that includes a mouthpiece or other component to which a user applies their mouth in use. Although the cartridges are generally described herein with respect to a heater portion and a mouthpiece portion for simplicity, it will be appreciated that additional portions can be provided within the cartridge, which can be at least partially upstream, between, downstream, adjacent, within and/or exterior to the heater portion and/or mouthpiece portion. For example, an external wrapper or shell can be exterior to both the heater portion and mouthpiece portion, a space or component(s) can be disposed between the heater portion and mouthpiece portion, the heater portion can include an insert and/or end cap upstream or at least partially within the heater portion, the mouthpiece portion can include an insert and/or end cap downstream or at least partially within the mouthpiece portion, and/or the like. As illustrated, the vaporizer device **200** can include one or more input devices **216***a*, **216***b* (collectively referred to as input devices **216**), such as a pair of input devices **216***a* on opposing sides of the vaporizer body **210** and/or one or more input devices **216***b* on the ledge **221**. In some implementations, the one or more input devices **216** can include a button (e.g., plastic, metal, elastomeric), a capacitive sensor, and/or the like. A controller of the vaporizer device **200**, similar to controller **104** of FIGS. **1**A-**1**B, can be configured to detect actuation (e.g., touch or force) of the one or more input devices **216** based on signals or data provided by the one or more input devices **216**. In implementations where multiple input devices **216** are present, a controller **104** of the vaporizer device **200** can be configured to activate the vaporizer device **200** only in response to detecting actuation of all of the input devices **216** (e.g., two input devices **216***a* located at opposing sides of the vaporizer body **210**). It can be beneficial to provide multiple input devices **216** in different locations that are less likely to each be activated accidentally (e.g., in locations most likely to be touched all at the same time only during active use of the vaporizer device **200**).

[0292] In some implementations, the controller **104** of the vaporizer device **200** can be configured to select predetermined operating temperatures and/or heating profiles from among N temperatures or profiles. In accordance with these implementations, the controller **104** of the vaporizer device **200** can be configured (and thereby a user can be allowed) to select a temperature or profile based on detecting actuation of the one or more input devices **216**. In some implementations, two or more input devices **216** (e.g., input devices **216***a*) can be used to increase and decrease the currently selected operating temperature (also referred to as target temperature) and/or profile between a range of zero (0) through N temperatures and/or profiles, where zero means the vaporizer device **200** is in an "off" state (e.g., not actively heating the receptacle **218** but otherwise configured to detect interactions with one or more components of the vaporizer device **200**). Accordingly, one of the two or more input devices **216** can be actuated to increase the currently selected operating temperature and/or profile and another of the two or more input devices **216** can be actuated to decrease the currently selected operating temperature and/or profile. The two or more input devices **216** can be actuated to provide for switching between the "off" state and an "on" state (e.g., where the "on" state starts at the lowest preconfigured temperature and/or profile) when both of the two or more input devices **216** or a dedicated one of the two or more input devices **216** are/is actuated (e.g., held down or pressed) for a predetermined time. In other implementations, one input device **216** can be actuated to increase the temperature and/or profile through a range of zero (0) through N operating temperatures and/or profiles, and/or the one input device **216** can be held down to switch between the "off" state and the "on" state.

[0293] In some implementations, the controller **104** of the vaporizer device **200** can be configured to operate (e.g., power the heating element **142** as described herein) at one or more predetermined operating temperatures, such as based on a default or user-selected heating profile. For example, in some heating profiles, the controller of the vaporizer device **200** can be configured to power the heating element **142** at a first operating temperature for a first period of time, power the heating element **142** at a second operating temperature for a second period of time, power the heating element **142** at a third operating temperature for a third period of time, and/or the like. In some implementations, the controller **104** of the vaporizer device **200** can be configured to power the heating element **142** at approximately 270 degrees Celsius for approximately 20 seconds, power the heating element **142** at approximately 250 degrees Celsius for the next 25 seconds, and power the heating element **142** at approximately 220 degrees Celsius for a remainder of a vaporizing session (e.g., until the cartridge is sufficiently used and/or a max duration of time is reached).

[0294] In some implementations, the controller **104** of the vaporizer device **200** can be configured to detect when the heater portion **241** is present within the receptacle **218** and/or for a sufficient duration of time. In response to determining that the heater portion **241** is present within the receptacle **218** and/or for a sufficient duration of time, the controller of the vaporizer device **200** can switch the vaporizer device **200** between the "off" state and the "on" state, increase the temperature to a range of zero (0) through N target temperatures, implement a predetermined (e.g., user-selected) profile from a plurality of zero (0) through N different profiles, and/or the like.

[0295] In some implementations, the controller **104** of the vaporizer device **200** can be configured to determine whether a cartridge **220** is spent and/or should be changed. This can occur when all, most, or an estimated threshold amount of one or more compound present in the vaporizable material **202** contained within the cartridge **220** has been converted to the gas phase, when an insufficient amount or quality of the vaporizable material **202** is present to provide an inhalable aerosol that would be satisfying to a user, and/or the like. For example, based on the length of time the cartridge **220** is heated, the temperatures at which the cartridge **220** is heated across the length of time or the temperatures at each of a plurality of time segments (which can be measured via the controller **104** of the vaporizer device **200** as described herein), and/or the like, the controller **104** of the vaporizer device **200** can be configured to determine that the cartridge **220** is spent and/or should be changed. Based on determining that the cartridge **220** is spent and/or should be changed, the controller **104** of the vaporizer device **200** can be figured to provide an indication that the cartridge **220** is spent and/or should be changed, switch the vaporizer device **200** into the "off" state, and/or the like. During operation, the controller **104** of the vaporizer device **200** can be configured to provide indications of an estimated amount of vaporizable material **202** left in the cartridge **220** and/or an estimated amount of time remaining in a vaporizing session during which the vaporizable material **202** may be used (e.g., a period of time starting when the vaporizer device **200** is heated or when the receptacle **218** reaches a predetermined operating temperature and ending when the cartridge **220** is spent and/or should be changed). In some implementations, the controller **104** can be contained in and/or in communication with the vaporizer body **210** and/or the cartridge **220**.

[0296] The vaporizer device **200** can include a plurality of outputs **217** (e.g., LEDs) that can be similar to the output(s) **117** (e.g., vibration, sound, and/or the like), and the controller **104** of the vaporizer device **200** can be configured to illuminate one or more of the LED outputs **217** in response to detecting actuation of one or more of the input devices **216**, in response to detecting a cartridge **220** has been inserted into the receptacle **218**, to indicate one or more of the following: the currently selected operating temperature and/or temperature profile; the current temperature of the receptacle **218**; the current temperature of the receptacle **218** relative to the currently selected operating temperature and/or temperature profile; the current temperature of the receptacle **218** has reached the currently selected operating temperature, an estimated amount of useable vaporizable material remaining in a cartridge **220** (e.g., by selectively illuminating more or less of the LED outputs **217**); an estimated amount of time remaining in a vaporizing session (e.g., by selectively illuminating more or less of the LED outputs **217**); an indication that the cartridge **220** is spent and/or should be changed; and/or the like. In some implementations, the one or more input devices **216** can include one or more of the LEDs described (additionally or alternatively to the LED outputs **217**), be at least partially surrounded by the LEDs, and/or be positioned relative to the LEDs such that a perimeter (e.g., halo) of light at least partially surrounds a perimeter of the one or more input devices **216**.

[0297] The controller **104** of the vaporizer device **200** can be configured to illuminate the LEDs (e.g., the plurality of LED outputs **217** and/or LEDs proximate one or more of the input devices **216**) in one or more colors and/or according to one or more patterns. For example, the controller **104** of the vaporizer device **200** can be configured to illuminate the LEDs according to different colors to indicate a current temperature of the receptacle **218** (e.g., oven), blink one or more times to indicate the current temperature of the receptacle **218** has reached the currently selected operating temperature, and/or the like. Additionally or alternatively, the controller **104** can be configured to provide haptic feedback (e.g., via one or more outputs **217**, such as a motor, a linear resonant actuator, and/or the like) to indicate the one or more input devices **216** have been pressed, whether the vaporizer device **200** has switched between the "off" state and/or the "on" state (e.g., that the receptacle **218** is heating up), a current temperature of the receptacle **218** (e.g., in a periodic pattern with increasing frequency), whether the current temperature of the receptacle **218** has reached the currently selected operating temperature, when threshold amounts of the estimated amount of useable vaporizable material remaining in a cartridge **220** are reached, when threshold amounts of estimated amounts of time remaining in the vaporizing session are reached, that the cartridge **220** is spent and/or should be changed, and/or the like.

[0298] FIG. **3** illustrates a perspective view of an implementation of a cartridge **320** in an exploded schematic form, consistent with implementations of the current subject matter. The cartridge **320** can be an implementation of one or more components of the cartridges **120** of FIGS. **1**A-**1**B and/or the cartridge **220** of FIG. **2**, and/or can be configured for use within a vaporizer device such as the vaporizer devices **100***a*, **100***b* of FIGS. **1**A-**1**B and/or the vaporizer device **200** of FIG. **2**. As used herein, an "end cap" can refer to at least one of a variety of materials and/or elements that are positioned adjacent a side of vaporizable material and/or a container for containing vaporizable material within the cartridge **120**. In some implementations, the end cap can be positioned at an end of the cartridge **120**. In some implementations, the end cap can be positioned offset (e.g., along the length of the cartridge **120**) from an end of the cartridge **120**, including not being a most distal or proximal element along an implementation of the cartridge **120**. For example, the end cap can form a part of an outer surface of the cartridge **120** and/or the end cap can be fully contained within the outer surface of the cartridge **120**.

[0299] As illustrated, the heater portion **341** can include a heating element **342** and vaporizable material **302**. The heating element **342** and/or the vaporizable material **302** can extend between a heater portion proximal end **341***a* and a heater portion distal end **341***b*. In implementations where the heater portion **341** width is greater than the heater portion **341** depth (e.g., in a 3:2 ratio, 9:5 ratio, 2:1 ratio, 9:4 ratio, 5:2 ratio, or greater ratio), heat transfer may be more efficient. For example, relative to a cylindrical surface, a heating element **342** that includes two wider, opposing surface areas (e.g., faces) with a shorter distance between the two opposing surfaces can allow for a vaporizer device that only needs to actively heat from one or two of the opposing sides, as opposed to on all surfaces of a cylindrical surface. The remaining portions of the heating element **342** that are not actively heated can be configured to absorb and redistribute heat from the nearby regions that are actively heated, thereby providing heat to a much larger surface area of the vaporizable material **302** compared to a cylindrical surface. While this non-cylindrical structure (e.g., elliptical or oval) is harder to manufacture than a cylindrical structure, it provides benefits to the user by making the system easier and more comfortable to use (e.g., more ergonomic structure that fits the natural shape of a user's lips). Additionally, the use of less power due to increased efficiency allows for longer battery life and/or less spatial constraints on the vaporizer device (e.g., a smaller battery may be used). Ultimately, the manner in which the heating element **342** is heated can affect the temperature at which the vaporizable material **302** is heated and/or the rate at which one or more compounds present in the vaporizable material **302** are converted to the gas phase and/or otherwise released from the vaporizable material **302**.

[0300] As discussed herein, the heating element **342** can be configured to convert electrical energy into heat (e.g., through inductive heating, resistive heating, etc.). However, in some implementations, the heating element **342** of FIG. **3** may instead be regarded as a container (e.g., similar to the container **123** of FIG. **1**B) that receives heat from an external heat source and distributes it to the vaporizable material **302**. In implementations in which inductive heating is used to heat the heating element **342**, providing a wider surface area also has further benefits. For example, it is easier to generate eddy currents in wider and flatter surfaces as compared to a smaller or curved surface. Additionally, larger surface areas of a heating element **342** allow for more surface area of the heating element **342** to be in direct and thermal contact with a larger area of the vaporizable material **302**. These eddy currents can be generated over a larger surface area using less energy and/or the larger surface area can provide multiple, smaller regions that may be selectively targeted using a plurality of smaller inductors. In this regard, use of susceptors that are inductively heated, at least primarily, via formation of eddy currents rather that via hysteresis (as is the case for susceptors comprising magnetic and/or ferritic materials) can be advantageous. In implementations where eddy currents are the primary (e.g., entire) form of heat generation, the inductive coil(s) can include or otherwise be formed of Litz wire. As used herein, Litz wire can refer to a wire formed from a plurality of strands of metal (e.g., 5 strands, 10 strands, 20 strands, 40 strand, etc.) that are twisted or braided together, and may optionally include an outer insulation material, an internal core of material, and/or the like.

[0301] In some implementations, a susceptor is provided that is non-ferritic and/or non-magnetically permeable. For example, aluminum can be considered as non-ferritic and non-magnetically permeable, and thereby substantially unaffected by hysteresis. With no or substantially no influence on temperature created via hysteresis, the temperature of non-ferritic and/or non-magnetically permeable susceptors can be derived based on the direct relationship of the temperature of the susceptor and eddy currents, as described herein. Although inductors and/or inductive coils may be referred to herein as "heating" susceptors and/or heating element, it will be appreciated by those of skill in the art that heating in this sense can be regarded as an inductor generating magnetic and/or electromagnetic energy that is radiated into and absorbed by one or more segments of a susceptor, which is in turn converted into heat via eddy currents and/or hysteresis.

[0302] In some implementations, the heating element **342** extends between all or at least some part of the heater portion **341** length, and defines an interior volume between the heater portion **341** depth and width. The vaporizable material **302** can fill the majority of the volume, but other components may be present, such as an end cap configured to seal an end of the volume. In some implementations, the vaporizable material **302** can be formed from tobacco leaves (e.g., dried, cut, shredded, and/or reconstituted), tobacco stems (dried, cut, shredded, and/or ground), a carrier, and/or an acid (e.g., an organic acid such as benzoic acid, citric acid, and/or the like). The ratio of tobacco leaves to tobacco stems can be based on the total desired amount of nicotine to be delivered, and can vary with the strain of tobacco used. Tobacco stems can provide a similar sensation to smoking when vaporized, but with a lower nicotine content. The carrier can be formed of vegetable glycerin, propylene glycol, and/or the like. In some implementations, the carrier can form 30-50% of the total weight of the vaporizable material **302**. Because tobacco naturally includes some moisture, the percentage by weight of the carrier can be measured with respect to the dried weight of the vaporizable material.

[0303] Including a carrier such as vegetable glycerin as at least 30% of the dried weight of the vaporizable material **302** can create a smoother inhalable aerosol and provide a unique experience to users that is more pleasant than smoking combustible cigarettes and other available heat-not-burn products. For example, cartridges **320** containing vaporizable material **302** with a carrier forming at least 30% of the dried weight of the vaporizable material **302** can allow for a lower temperature of vaporization (e.g., by as much as approximately 100 degrees Celsius), and therefore less odor, higher flavor extraction efficiency, net reduction in HPHCs (harmful and potentially harmful constituents) such as via less charring, a more tunable experience, a more uniform vaporization of nicotine from tobacco over time, a faster heat up time (e.g., 10-15 seconds compared to 20-30 seconds, or more), and/or the like. In example implementations of the vaporizable material **302**, the tobacco leaves and tobacco stems are in an approximately 1:1, 1:2, 2:3, 3:4, or 4:5 ratio and vegetable glycerin forms at least 30% of the dried weight of the vaporizable material **302**, such as approximately 30%, 35%, 40%, 45%, or less than 50%. For example, in some implementations, the vaporizable material **302** includes tobacco leaves and tobacco stems in an approximately 1:1 ratio, and approximately 35% by weight (dried) of vegetable glycerin. Having a carrier in higher quantities can result in degradation of components of the vaporizer body **110**, **120**, such as the receptacle **118**, **218** if not properly compensated for.

[0304] In some implementations, a carrier (e.g., vegetable glycerin) can be added at multiple stages in the assembly of the cartridge **320**. For example, as part of a first series of steps, tobacco material (e.g., tobacco leaves and/or stems) can be dried and mixed with a carrier to form a mixture in which the carrier forms at least 20%, at least 25%, at least 30%, or at least 35% of the dried weight of the vaporizable material **302**. Prior to mixing the tobacco material with the carrier, the tobacco material can be cut, shredded, and/or the like. For example, the tobacco material can be formed as cut rag tobacco, such that it has a better ability to absorb the carrier. As part of a second series of steps, the resulting mixture can be formed into a shape (e.g., slug) that can be more easily incorporated into the cartridge **320**, and additional carrier material can be applied to the shape and/or a portion of the cartridge **320**. For example, in some implementations, an interior portion of the cartridge **320** (e.g., an interior of the heating element **342**) can be sprayed with additional carrier material. Additionally or alternatively, additional carrier material can be applied to the formed shape of vaporizable material **302**, such as by spraying and/or injection, before and/or after the vaporizable material is disposed within an interior volume of the heating element **342**. Once the cartridge **320** is completely assembled, the carrier can form at least 30%, at least 35%, at least 40%, at least 45%, or at least 50% of the dried weight of the vaporizable material **302**. Assembly in this manner can allow for the use of less complicated machinery for mixing tobacco material with a carrier, while also providing a cartridge **320** with a higher concentration of carrier in the vaporizable material **302**. In some aspects, applying additional carrier to the exterior of the formed shape of vaporizable material **302** and/or interior of the heating element **342** can help to provide a more uniform vapor and aerosol over time, relative to vaporizable material **302** that is formed via a simple mixture of tobacco material and a carrier, as the heat generated by the heating element **342** is more likely to vaporize the carrier first.

[0305] In order to control the composition of the inhalable aerosol, it can be beneficial to separate the tobacco material and the carrier of the vaporizable material. For example, FIGS. **17**A-**17**H illustrate block diagrams of various implementations of tobacco material **1798** and a carrier **1799** that can be combined into different forms of vaporizable material **1702***a*-**1702***h*. As illustrated in FIG. **17**A, the tobacco material **1798** and carrier **1799** can occupy approximately the same volume within the vaporizable material **1702***a*, and be positioned opposite each other relative to a cross-section defined by the length and width of the vaporizable material **1702***a*. As illustrated in FIG. **17**B, the tobacco material **1798** can occupy a volume that is less than the volume occupied by carrier **1799***a* and **1799***b* within the vaporizable material **1702***b* (e.g., in a 1:2 ratio, a 1:3 ratio, and/or the like), and the tobacco material **1798** can be positioned upstream and off axis from a cross-section defined by the length and width of the vaporizable material **1702***a*. As illustrated in FIG. **17**C, the tobacco material **1798** and carrier **1799** can occupy approximately the same volume within the vaporizable material **1702***c*, and be positioned opposite each other relative to a cross-section defined by the length and depth of the vaporizable material **1702***c*. As illustrated in FIG. **17**D, the tobacco material **1798** can occupy a volume that is greater than the volume occupied by carrier **1799** within the vaporizable material **1702***d* (e.g., in a 2:1 ratio, a 3:1 ratio, and/or the like), and the volume occupied by carrier **1799** can surround the volume occupied by the tobacco material **1798**. As illustrated in FIG. **17**E, the tobacco material **1798** and carrier **1799** can occupy approximately the same volume within the vaporizable material **1702***e*, and be positioned on top of each other relative to a cross-section defined by the depth and width of the vaporizable material **1702***e*. As illustrated in FIG. **17**F, the tobacco material **1798** and carrier **1799** can occupy different volumes within the vaporizable material **1702***f*, and be positioned on top of each other relative to a cross-section defined by the depth and width of the vaporizable material **1702***f*, with an air gap in between the tobacco material **1798** and carrier **1799**. As illustrated in FIGS. **17**G and **17**H, the tobacco material **1798** and carrier **1799** can occupy different volumes within the vaporizable material **1702***g*, **1702***h* and be positioned opposite each other relative to a cross-section defined by the length and width of the vaporizable material **1702***g*, **1702***h*.

[0306] In each of the implementations of FIGS. **17**A-**17**H, vaporized material from heating the tobacco material **1798** and heating the carrier **1799** can be combined to form a combined vaporized material, such as at or near the intersection of the volumes occupied by the tobacco material **1798** and the carrier **1799**. The volume in which the combined vaporized material is formed can be in fluid communication with a vapor inlet **1735**, which can be similar to the vapor inlets **335**, **435**, **635** described herein. In some implementations, a separate heating element **342** and/or inductor can be included to heat the respective volumes of tobacco material **1798** and carrier **1799**. Accordingly, different amounts of heat can be separately applied to the tobacco material **1798** (e.g., higher temperature) and the carrier **1799** (e.g., lower temperature) to optimize the user experience. In any of the implementations of FIGS. **17**A-**17**H, a wicking material comprising the carrier **1799** can be included to retain the carrier **1799** within a desired volume.

[0307] In some implementations, the heating element **342** can be formed of metal, such as aluminum, an aluminum alloy, copper, brass, zirconium, stainless steel (ferritic or non-ferritic), nickel, and/or the like. As described herein, aluminum is beneficial for spreading heat and stainless steel is better for localized heat. For an inductive heating approach, use of a non-magnetic material, such as aluminum, allows the creation of eddy currents in the susceptor heater, while a magnetic material, such as ferritic stainless steel, is inductively heated by a hysteresis mechanism. Different inductor coil arrangements are generally needed for these two heating approaches, which can have different requirements such as an amount of power required to generate an electromagnetic field. However, in some implementations, the heating element **342** is non-ferritic and non-magnetically permeable, which can simplify the design of the vaporizer device **100**, **200** and allow for tighter control in heating of the heating element **342**.

[0308] The heating element **342** can be formed of one or more pieces, and can define all or substantially all of the walls (e.g., a bottom wall and perimeter along the longitudinal axis, either or both of which can have perforations or other openings) that define the volume into which the vaporizable material **302** may be inserted. However, for ease of manufacturability, the heating element **342** can be a single sheet of metal that is configured to wrap (at least partially) around the perimeter of the heater portion **341**. The two ends of the heating element **342** sheet can meet or be in proximity to each other, at or near a joint location **345**, as shown in FIG. **3**, and optionally form a continuous loop. In some aspects, when assembled within the cartridge **320**, a surface of the heating element **342** primarily facing towards and/or touching the vaporizable material **302** can be regarded as an interior face of the heating element **342** and a surface of the heating element **342** primarily facing away from and/or not touching the vaporizable material **302** can be regarded as an exterior face of the heating element **342**. When the heating element **342** is formed of a paper-backed metal, the exposed surface of the metal material can be regarded as an interior face of the heating element **342** and the exposed surface of the paper material can be regarded as an exterior face of the heating element **342**. In implementations where an assembled heating element **342** includes overlapping and/or intersecting portions, the interior face and the exterior face of the heating element **342** can be defined with respect to the heating element **342** prior to assembly. In some aspects, a joint location **345** can be regarded as a location or region, at or near an end of the heating element **342**, such as where the end of the heating element **342** is at or near another end or another region of the heating element **342**. When portions of the heating element **342** overlap, the joint location **345** can optionally be regarded as the overlapping portion, bounded in part by the ends of the heating element **342**. Additionally or alternatively, in some aspects a joint location **345** can be regarded as a location or region, at or near where a joint is formed (e.g., via direct physical contact, welding, gluing, and/or the like) between two portions of the heating element **342**.

[0309] Optional variants of the heating element **342** and joint location **345** are illustrated in FIGS. **15**A-**15**E as heating elements **1542***a*-**1542***e* (collectively, heating elements(s) **1542**) and joint locations **1545**. In some implementations, a portion of the heating element **342**, **1542** proximate one end of the heating element **342**, **1542** (e.g., relative to a sheet of material that forms the heating element **342**, **1542**) at least partially overlaps with a portion proximate another end of the heating element **1542**, such as proximate the joint location **345**, **1545**. The overlapping portions can be welded, glued, crimped, interlocked, pressed, or otherwise connected together. For example, as illustrated in FIG. **15**E, the overlapping portions of the heating element **1542***e* can be connected together with the exterior face of the heating element **1542***e* proximate one end of the heating element **1542***e* contacting the interior as shown in FIG. **15**E, interior face of the heating element **1542***e* proximate another end.

[0310] The overlapping or intersecting portions of the heating element **1542** can be large enough that they form a capacitive region **1549**, which can improve performance of the heating element **1542** by providing a path for electrical current to flow across or through the capacitive region **1549**. The capacitive region **1549** can be regarded as (or at least including) a region of the heating element **1542** where a path for electrical current to flow is formed between overlapping, intersecting, or otherwise connected, adjacent portions of the heating element **1542**.

[0311] In some implementations, the overlapping portions of the heating element **1542** in the joint location(s) **1545** and/or capacitive region **1549** can be connected together (e.g., welded, glued, crimped, interlocked) together such that any intermediate non-metal or non-conductive portions of the heating element **1542** are sufficiently broken down or removed to provide a path for electrical current to flow between the overlapping portions. For example, if the heating element **1542** is formed from a paper-backed metal, the intermediate paper portion between the two overlapping metal portions of the heating element **1542** can be broken down or removed such that electrical current can flow between the metal portions.

[0312] In some implementations, an electrically conductive adhesive can be applied to the overlapping or intersecting portions (e.g., within the joint location(s) **1545** or capacitive region **1549**), which can further improve the path for current flow. For example, the electrically conductive adhesive can include a glue or paste including silver, gold, copper, graphite, aluminum and/or other conductive materials.

[0313] In some implementations, the ends of the heating element **1542** are bent (e.g., both inwards towards or both outward away from the vaporizable material **302**, such as at approximately right angles), proximate the joint location **345**, and the intersecting portions are welded, glued, crimped, interlocked, or otherwise connected together. In other implementations, the ends of the heating element **1542** can be formed into complementary shapes that are designed to mechanically interlock, such as with opposing tabs formed at opposing ends of the heating element **342**, **1542**

(e.g., relative to a sheet of material that forms the heating element), configured to secure to each other when the opposing ends of the heating element **342**, **1542** are combined.

[0314] In other implementations, the heating element **1542** is made of sufficiently rigid material such that the ends do not need to be physically coupled to each other, but can be in contact with each other. In other implementations, the ends of the heating element **1542** are in close proximity to each other but do not physically touch (see e.g., FIG. **15**B). For example, the heating element **1542** can be configured to wrap around between 95% to 99%, greater than 90%, and/or less than 100% of an interior perimeter of the cartridge **320** and/or an interior perimeter of the heater portion **341**. In other implementations, the ends of the heating element **1542** are in close proximity to each other and one or more bridges (which can also form one or more capacitance regions **1549**) between the heating element **1542** ends are formed via welding (e.g., laser welding, ultrasonic knurling, electron beam welding, gas flame welding, friction welding, etc.), and/or the like. For example, as illustrated in FIGS. **15**C and **15**D, bridges can be formed as the illustrated capacitive regions **1549**. In other implementations, the heating element **1542** is formed as a single, continuous loop of material without a joint location **345**, **1545** (see e.g., FIG. **15**A).

[0315] As described herein, specific portions of the heating element **342**, **1542** can be modified (e.g., during manufacture, during use, etc.) to provide particular electrical properties that allow for more control over the current flowing through heating element **342**, **1542**.

[0316] Having a heating element **342** in the form of a continuous loop can create an electrically conductive path around the heating element **342**. Being formed in the shape of continuous loop can increase the efficiency of the heating element **342** and thereby the efficiency of the vaporizer devices **100** utilizing such structures. However, such improvements in efficiency can be greater for systems where the heating element **342** is inductively heated via an inductor that is in the form of a coil wrapped, in a plurality of turns, around a region near the perimeter of the heating element **342** (see e.g., inductor **543** of FIG. **5**D).

[0317] In other implementations, inductive coils that are not wrapped around an area near the perimeter of the heating element **342** can be utilized such that it is easier to manufacture each heating element **342** and/or cartridge **320**. For example, inductive coils that are instead placed in, but not completely wrapped around, different regions near the perimeter of the heating element **342** can be implemented such that a complete, electrically conductive path around the heating element **342** is not required to achieve an efficient system (see e.g., FIGS. **5**A-**5**C, FIGS. **11**A-**11**I, **12**A-**12**E, **13**A-**13**G, **14**A-**4**C). In accordance with such implementations, each heating element **342** and/or cartridge **320** can be manufactured such that the ends of the heating element **342** meet at the joint location **345** without interlocking or welding, which can make manufacturing more efficient and/or cheaper.

[0318] In this regard, non-cylindrical cartridges **320** and receptacles **118**, **218** that are configured to receive the non-cylindrical cartridges **320** can have additional advantages that are not present in traditional, cylinder-based systems. For example, a non-cylindrical cartridge **320** that is configured to fit within a corresponding receptacle **118**, **218** in only one or two orientations, can allow for certain components of the vaporizer body **110**, **210** and cartridge **320** to be disposed at a particular orientation each time. As such, to benefit from the cheaper manufacturing without interlocking or welding while still increasing efficiency each heating element **342** and/or cartridge **320** can be manufactured such that the joint location **345** is disposed in a specific, known location, such as on one of the shorter sides of the cartridge **320**, or one of the longer sides of the cartridge **320**. The placement of the joint location **345** can be beneficial if the joint location **345** is disposed in a location that is away from the driving circuitry **143**, such as inductive coils configured to generate an electromagnetic field. In some aspects, the joint location **345** can be regarded as being off-axis of the primary plane of electromagnetic fields generated by the inductive coils and/or in a location that is outside of a perimeter of each inductive coil. If the joint location **345** was instead disposed near the driving circuitry **143** (e.g., within the primary plane of an electromagnetic field generated by an inductive coil and/or in a location that is within a perimeter of an inductive coil), this would decrease the coupling efficiency between the inductive coil and the heating element **342**, and thereby decrease the efficiency of the entire system.

[0319] In some implementations, the heating element **342** can be manufactured to include a structure that is optimized and/or tuned in a manner that results in the desired coupling with inductive coils. For example, it is possible to make a simple structure for the heating element **342** that couples very well with inductive coils but ultimately results in the heating element **342** reaching too high of a temperature, thereby burning the vaporizable material **302**. In some aspects, this issue may be present only in certain regions of the vaporizer material **302**, and thereby make it beneficial to more evenly absorb and/or distribute energy across the heating element **342**. Accordingly, in some implementations, the heating element **342** can be perforated or cut (e.g., via a laser) to adjust its coupling efficiency, such as by making torturous paths for the eddy currents to flow through the heating element **342**.

[0320] In example implementations, the heating element **342** is made to include an aluminum alloy or other metal, such as aluminum foil, which can be in a range of 50-150 μm thick, such as 50-100 μm thick, 60-80 μm thick, 70-90 μm thick, 75-85 μm thick, and optionally approximately 80 μm thick. In some implementations, the heating element **342** can include a paper-backed metal, which can increase the structural integrity and/or rigidity of a cartridge manufactured with such a structure, relative to the structural integrity of a shape formed with certain metals alone (e.g., aluminum). For example, the paper-backed metal can include a layer of metal disposed interior to at least one layer of paper such that the metal layer is in direct contact with and/or can provide better thermal transfer to the vaporizable material **302**, and may optionally be disposed between (e.g., sandwiched) two layers of paper. In such implementations, the metal can be in a range of 3-15 μm thick, such as 5-10 μm thick, 6-8 μm thick, and optionally approximately 6.5 μm thick. In related implementations, the paper layer(s) and the metal layer can be sized such that the overall thickness of the heating element **342** is in a range of 50-150 μm thick, such as 50-100 μm thick, 60-80 μm thick, 70-90 μm thick, 75-85 μm thick, and optionally approximately 80 μm thick. Accordingly, the paper layer can be in a range of 35-145 μm thick, such as 40-100 μm thick, 50-70 μm thick, 55-75 μm thick, 60-80 μm thick, 65-75 μm thick, and optionally approximately 70 μm thick. The total thickness of the heating element **342** can be measured as either inclusive or exclusive of the thickness of any wrapper **322** that is wrapped around the heating element **342**, as described herein. For example, a wrapper **322** that is exterior to and/or connecting the heater portion **341** and the mouthpiece portion **330** can be included within or excluded from the thickness measurements described herein. For example, the wrapper **322** can be made out of one or more of a cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like.

[0321] If a thinner metal is used for the heating element **342**, then increases in coupling efficiency and/or higher temperatures of the heating element **342** with lower total energy can be achieved. The metal of the heating element **342** can include an aluminum alloy, such as aluminum foil. In other implementations, the metal can include another alloy, such as invar. In some implementations, the heating element **342** can be formed of a cladded metal, which can take advantage of benefits of different metals. For example, the heating element **342** can comprise a cladding metal formed from an aluminum alloy and stainless steel, which could take advantage of the higher coupling efficiency of stainless steel and the higher heat transfer of aluminum.

[0322] In implementations where the heating element **342** comprises or is comprised within a paper-backed metal that includes an exterior paper layer and an interior metal layer, an additional material may be provided between the metal layer of the heating element **342** and the vaporizable material **302**. For example, a layer of reconstituted tobacco can be disposed between the metal layer of the heating element **342** and the vaporizable material **302**. Placing an additional layer of material between the heating element **342** and the vaporizable material **302** can provide a buffer for unwanted substances being vaporized and/or forming part of the aerosol that is inhaled by a user. Separately, the additional layer of material can absorb substances (e.g., liquid) from the vaporizable material **302** when the vaporizable material **302** is heated. For example, if glue is used to form the shape of the heating element **342**, the additional material can provide a benefit of absorbing any glue or other materials from the metal layer and/or vaporizable material **302**. In other implementations, an additional material (e.g., layer of reconstituted tobacco) may additionally or alternatively be provided between the metal layer of the heating element **342** and the exterior paper layer. Such implementations can also similarly provide a benefit of absorbing any glue or other materials, from the metal layer and/or the exterior paper layer. For example, if glue is applied to the exterior paper layer the additional layer of material can absorb any glue that comes off of the paper layer, provide a buffer that prevents the heat generated by the metal layer from causing any burning or degradation in the glue, and/or the like. In some implementations, multiple paper layers can be provided exterior and/or interior to the metal layer of the heating element **342**.

[0323] In some implementations, one or more paper layers exterior and/or interior to the metal layer of the heating element **342** can be coated with and/or formed of material that is configured to absorb liquid from the vaporizable material **302** to reduce the occurrence of any liquid exiting the cartridge **320** (e.g., being left as residue in the vaporizer body **110**, **210**). For example, a layer of paper material external to the metal layer can be coated with a material that repels liquid and/or is non-liquid permeable (or at least has a lower liquid permeability than typical paper materials used in cigarettes) such that the direction of flow of any liquid from the vaporizable material **302** can be controlled (e.g., such that it does not leak out of a perimeter of the heating element **342** and/or cartridge **320**). In such implementations, any liquid from the vaporizable material **302** can be retained within the cartridge **320** itself, such as through the use of inserts (e.g., filters) and/or end caps at or near the heater portion proximal end **341***a* and/or the heater portion distal end **341***b*, such as the inserts and end caps described herein.

[0324] Although the paper-backed metal is described as including paper or reconstituted tobacco, other materials can be implemented instead, such as one or more of corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic (e.g., PET), cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like, and paper is only described herein for simplicity. Although various layers of materials are described as being internal or external, there can be additional materials that are internal or external to each of the described materials. For example, if the heating element **342** comprises or is comprised within a paper-backed metal that includes an exterior paper layer and an interior metal layer, an additional material may be provided on the exterior of the exterior paper layer when the cartridge **320** is finally assembled, such as an additional wrapper **122** and/or the wrapper **322** in the mouthpiece portion **330** extending to the exterior of the heater portion **341**. In various implementations that include a heating element **342** formed as a metal susceptor, the heating element **342** can be configured to heat air passing at or near the exterior of the cartridge **320**, prior to the air entering the cartridge **320** and passing through the vaporizable material **302**.

[0325] As illustrated in FIG. **3**, the mouthpiece portion **330** can include an insert **324** that is wrapped in a wrapper **322** or some other shell or layer of material. The wrapper **322** can be similar to the outer layer (e.g., wrapper(s) **122**) of FIGS. **1A-1B**. For example, the wrapper **322** can be made of material such as one or more of a paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic (e.g., PET), non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like. The insert **324** can be similar to the insert(s) **124** of FIGS. **1A-1B**. For example, the insert **324** can be made of material such as one or more of paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic (e.g., PET), cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like.

[0326] The insert **324** and/or layer of material (e.g., wrapper **322**) can extend between a mouthpiece portion proximal end **330***a* and a mouthpiece portion distal end **330***b*, and the total distance between these two ends can be referred to as the mouthpiece portion **330** length. Similar to the heater portion **341**, the mouthpiece portion **330** can include a shorter mouthpiece portion **330** depth transverse to its length, and a longer mouthpiece portion **330** width that is transverse to both its length and depth. These dimensions can extend in the same axes as the heater portion **341**.

[0327] As illustrated in FIG. **3**, the insert **324** can include a plurality of airflow outlet channels **326** that extend from a plurality of corresponding vapor inlets **335** at the mouthpiece portion distal end **330***b* to a plurality of corresponding airflow outlets **328** at the mouthpiece portion proximal end **330***a*. The airflow outlet channels **326** thereby form a fluid connection between the heater portion **341** and the airflow outlets **328**, such that vapor generated in the heater portion **341** may be drawn towards a user at the mouthpiece portion proximal end **330***a*, and ultimately out of the airflow outlets **328** as an inhalable aerosol. Proximate to the mouthpiece portion distal end **330***b* (at least more proximate than to the mouthpiece portion proximal end **330***a*), the insert **324** can further include a plurality of bypass channels **338** that each extend from corresponding bypass air inlet **329** to corresponding bypass outlets **327**, and thereby form a fluid connection between the airflow outlet channels **326** and ambient air. In some implementations, the airflow outlet channels **326** and/or the bypass channels **338** can be created via a laser-cutting operation through walls of the insert **324** during the manufacturing process.

[0328] The heater portion **341** can include one or more cartridge inlets (e.g., though-holes) at the heater portion distal end **341***b* configured to allow external air (i.e., external to the cartridge **320**, such as ambient air) to enter the volume defined at least in part by the heating element **342**. In some aspects, the volume defined at least in part by the heating element **342** can be referred to as a heater chamber, as it is a physically bound location in which heating is occurring. The heater chamber can be in fluid communication with the heater portion proximal end **341***a*, which may include one or more outlets. Accordingly, the one or more outlets at the heater portion proximal end **341***a* can be in fluid communication with the one or more cartridge inlets at the heater portion distal end **341***b*, via the heater chamber.

[0329] When a user draws on the mouthpiece portion **330** at the mouthpiece portion proximal end **330***a*, this can cause external air to enter one or more cartridge inlets (e.g., though-holes) at the heater portion distal end **341***b* and cause ambient air to enter the plurality of bypass air inlets **329** at approximately the same time. The external air that enters at the heater portion distal end **341***b* can subsequently pass through the vaporizable material **302** as it is heated to entrain the vaporized material (also referred to as "vapor") generated within the heater chamber including the volume defined at least in part by the heating element **342**. Meanwhile, the air that entered the plurality of bypass air inlets **329** can subsequently pass through the plurality of bypass channels **338** and out of their corresponding bypass outlets **327**, entering their respective airflow outlet channels **326**. The air that entrains the vaporized material **302** in the heater chamber (including the volume defined at least in part by the heating element **342**) can subsequently pass through one or more outlets at the heater portion proximal end **341***a* and into the plurality of vapor inlets **335** at the mouthpiece portion distal end **330***b*, entering the plurality of airflow outlet channels **326**. As the vapor and air from the heater portion **341** traverse the plurality of airflow outlet channels **326**, they mix with the ambient air that entered through the plurality of bypass air inlets **329** to form an inhalable aerosol. The area in which the mixing and/or condensation occurs can be referred to as a condensation chamber. Accordingly, each of the plurality of airflow outlet channels **326** can include one or more condensation chambers configured to condense the entrained vapor with the ambient air to form at least a portion of the inhalable aerosol. For example, at least a part of one or more airflow outlet channels can include one or more condensation chambers. In some implementations, the entirety or majority of an airflow outlet channel **326** of the plurality of airflow outlet channels **326** can include one or more condensation chambers. As such, in some implementations, a part of at least one airflow outlet channel **326** may not include at least one condensation chamber. In some implementations, the condensation chamber (e.g., area in which the mixing and/or condensation occurs) can be a part of an element and/or space that is separate from and/or outside of the airflow outlet channel **326**. The inhalable aerosol ultimately travels out of the plurality of airflow outlets **328** at the mouthpiece portion proximal end **330***a* and into the mouth of a user. Accordingly, the plurality of airflow outlets **328** can be in fluid communication with the at least one condensation chamber in a corresponding one of the plurality of airflow outlets **328**, and/or configured to deliver the inhalable aerosol to a user. Collectively, the path of air, vapor, and inhalable aerosol within the cartridge **320** can be referred to as the airflow path of the cartridge **320**. The overall airflow path of a vaporizer device that includes the cartridge **320** is further defined by the vaporizer body, which is described in greater detail below. Although the flow of "air" is described herein, depending on the location within or even outside of the cartridge **320**, the "air" can contain other matter, such as gas-phase and/or condensed-phase material suspended in a stationary or moving mass of air or some other gas carrier (e.g., an aerosol), a liquid or solid at least partially transitioned to the gas phase (e.g., a vaporizable material), and/or the like.

[0330] Generating an inhalable aerosol in this manner can be beneficial, as it provides a larger fluid volume within which the aerosol can be formed and cool. For example, compared to a singular airflow outlet channel, providing two independent airflow outlet channels **326** within the mouthpiece portion **330** can increase the total fluid volume within which the aerosol can be formed and cooled, while still providing smaller fluid volumes that are easier to control, provide a better restriction to draw, and in which a larger overall portion of the vapor is able to independently mix with ambient air.

[0331] Although illustrated as a generally flattened cylindrical shape, a cross-section of the mouthpiece portion **330** and/or the heater portion **341** can be a different shape. For example, in some implementations, a cross-section of the mouthpiece portion **330** and/or the heater portion **341** can be similar to one or more of the cross-sections of FIGS. **8**A-**8**F. The cross-section may be anywhere between the respective distal and proximal ends of each of the mouthpiece portion **330** and/or the heater portion **341**.

[0332] Although the heater portion **341** and the mouthpiece portion **330** are illustrated separately in FIG. **3**, they may be combined, such as by one or more external layers (e.g., similar to the wrappers **122** of FIGS. **1**A-**1**B). For example, the layer(s)/wrapper(s) can be made of material such as one or more of a paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic (e.g., PET), non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like. Separately, in some implementations, more or less components and/or features may exist in the heater portion **341** and/or the mouthpiece portion **330**, the components and/or features of the heater portion **341** and/or the mouthpiece portion **330** may be disposed in different locations and/or take different physical forms, and/or components of the heater portion **341** and the mouthpiece portion **330** may be swapped.

[0333] Although the various airflow pathways are all illustrated as being formed through a singular insert **324**, there may be more than one insert **324** and/or additional or alternative components within the mouthpiece portion **330** through which the airflow pathways are defined. Additionally, although multiple instances or singular instances of the various features and components are described, more or less instances may be provided. Further, although the various features and components that define the airflow path have been illustrated and described as being at specific locations and taking specific shapes, other locations and/or shapes are contemplated. For example, although the bypass channels **338** are illustrated as being defined in a direction that is approximately parallel to the mouthpiece portion **330** depth in some implementations the bypass channels **338** can be angled downward (i.e., forming an angle below the first transverse axis). For example, the bypass channels **38** can be angled, such as angled upward and/or downward with respect to the cartridge **120** width and/or towards at least one vapor inlet **335**. This can introduce more turbulence into the airflow path and promote better mixing of air and vapor. Various implementations of these alternative cartridge configurations are described in greater detail below.

[0334] FIGS. **4**A-**4**Q illustrate cross-sectional schematics of various implementations of a vaporizer device **400***a-q* consistent with implementations of the current subject matter. For purposes of simplicity only, certain components of the vaporizer devices **400***a-q* are not illustrated. Further, these vaporizer devices **400***a-q* can be implementations of one or more components of the vaporizer devices **100***a*, **100***b* of FIGS. **1**A-**1**B, the vaporizer device **200** of FIG. **2**, and/or the cartridge **320** of FIG. **3**.

[0335] As illustrated in FIGS. **4**A-**4**B, the vaporizer device **400**, **400***a* can include a vaporizer body **410** and a cartridge **420** containing a vaporizable material **402**. The vaporizer device **400**, **400***a* illustrated in FIG. **4**B is taken along cross-section A-A from FIG. **4**A. As illustrated, the vaporizer body **410** can include a holder assembly **458** and one or more sensors **413**. The holder assembly **458** can include a frame **447** defining a receptacle **418**, and can optionally include a plurality of ridges **446** within the receptacle. As illustrated in FIG. **4**A, external to the frame **447** and the receptacle **418**, the holder assembly **458** can include or otherwise be coupled to one or more inductors **443** and/or one or more flux concentrators **448**. In some implementations, each of the one or more inductors **443** can include an inductive coil configured to generate an electromagnetic field. In some implementations, each of the one or more flux concentrators **448** can include a magnetic material (e.g., ferritic material) configured to control and/or direct an electromagnetic field, generated by a respective inductor **443**, such as by changing magnetic properties of the field. In some implementations, each of the one or more flux concentrators **448** can include a nanocrystal material, a nanometal material, and/or the like. Although various implementations are described with the holder assembly **458** including inductor(s) **443** and/or flux concentrator(s) **448**, it will be appreciated that such configurations of the holder assembly **458** are not required. In some implementations the inductor (s) **443** and/or flux concentrator(s) **448** can be secured to or within other components of the vaporizer body **410** that do not define the receptacle **418**. For example, the inductor(s) **443** can be secured to or within a holder assembly **458** and the flux concentrator(s) **448** can be secured to or within other component(s) of the vaporizer body **410** that are external to the holder assembly **458** (e.g., component(s) that are further away from the receptacle **418** and closer to the external shell of the vaporizer body **410**). Alternatively, the inductor(s) **443** and the flux concentrator(s) **448** can be secured to or within other component(s) of the vaporizer body **410** that are external to the holder assembly **458**.

[0336] In some implementations, the plurality of ridges **446** can be configured to retain the cartridge **420** within the receptacle **418**, such as by applying force against the heater portion **441** of the cartridge **420**. In some implementations, the cartridge **420** can be large enough to apply force in a direction that is opposite the force of the plurality of ridges **446**, potentially resulting in a slight deformation of the heater portion **441**. As illustrated, the plurality of ridges **446** can be positioned on one or both of the longitudinal walls and the lateral walls of the cartridge receptacle **418**. Although the plurality of ridges are illustrated as bulges, other geometries can be used.

[0337] As illustrated, the cartridge **420** can include a mouthpiece portion **430** and a heater portion **441** within one or more layers of material (illustrated as wrapper(s) **422**).

[0338] The heater portion **441** can include one or more heating element(s) **442**, which at least partially defines a volume within which the vaporizable material **402** is held. The heating element(s) **442** can be configured to heat the vaporizable material **402** to generate a vapor. As described herein, the heat can be generated through inductive means, although conductive and/or convective heating can also be provided. For example, eddy currents may be induced in the heating element(s) **442** via induction, which in turn cause the heating element(s) **442** to heat up. If the vaporizable material **402** is in direct contact with the heating element(s) **442**, then the vaporizable material **402** may be heated via conductive heating at the points of direct contact. Additionally and/or alternatively, the heat produced by the heating element(s) **442** can be picked up by air passing along or near the heating element(s) **442** and distribute the heat to portions of the vaporizable material **402** that are not in physical contact with the heating element(s) **442**, thereby heating the vaporizable material **402** via convective heating. The volume within which the vaporizable material **402** is held can be regarded as a heater chamber. For example, the volume defined at least in part by the heating element **442** can be referred to as a heater chamber. Accordingly, the heating element(s) **442** can define at least a portion of a perimeter of a heater chamber containing the vaporizable material, and in some implementations define substantially all of the perimeter. Arrows shown extending from the heating element **442** can indicate a direction of heat flow and/or heat transfer from the heating element **442**, such as the opposing sets of horizontal arrows extending from the heating element **442** and directed towards a center of the heating chamber defined by the heating element **442** and/or towards a center of the vaporizable material **402**, as shown in FIGS. **4**A-**4**Q. As shown in FIG. **4**P, arrows are also shown extending from the heating element **442** extending along an end of the cartridge **420** and indicate a direction of heat flow and/or heat transfer from the heating element **442** and directed towards a center of the heating chamber defined by the heating element **442** and/or towards a center of the vaporizable material **402**. As shown in FIGS. **4**A-**4**Q, arrows that are not extending from the heating element **442** can indicate a direction of fluid flow (e.g., airflow, inhalable aerosol, etc.) and/or a fluid pathway (e.g., airflow pathway, inhalable aerosol pathway, etc.).

[0339] The heater portion **441** can include an end cap at the cartridge distal end **420***b* to hold the vaporizable material **402** therein and/or define a lower boundary of the volume (e.g., heater chamber). However, in some implementations, the vaporizable material **402** can be formed with sufficient rigidity (e.g., in the form of a puck or another pre-formed shape) that an end cap is not necessary. In the event an end cap is included, it can include one or more cartridge inlets (e.g., though-holes) such that ambient air may enter the heater chamber. Additionally or alternatively, the end cap can include an air-permeable material such that air may enter the heater chamber through the material. The end cap can be regarded as a filterend cap (see FIG. **4**H), and/or include material such as one or more of paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic (e.g., PET), cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like. For example, the end cap can include corrugated paper material that is pressed or formed to fit within a region at the cartridge distal end **420***b*.

[0340] In some implementations, the material forming the one or more heating elements **442** can be further extended to enclose the cartridge distal end **420***b* and help retain the vaporizable material **402** (see e.g., FIG. **4**N). Accordingly, the one or more heating elements **442** can include a plurality of cartridge inlets such that external air (i.e., external to the cartridge **420**, such as the air within the receptacle **418**) may enter the heater chamber. The plurality of cartridge inlets in the one or more heating elements **442** can be through-holes formed in the direction of the cartridge **420** longitudinal dimension. Additionally or alternatively, the plurality of cartridge inlets in the one or more heating elements **442** can be through-holes formed in one or more directions that are perpendicular to the cartridge **420** longitudinal dimension, such as around a perimeter of the one or more heating elements **442** and/or proximate the cartridge distal end **420***b*. In the event the vaporizable material **402** is exposed at the cartridge distal end **420***b* (e.g., no end cap may be used), the boundary formed by the distal ends of the one or more heating elements **442** and/or the one or more layers of material (e.g., wrapper(s) **422**) can form one cartridge inlet such that ambient air may enter the heater chamber.

[0341] As illustrated between FIGS. **4**A-**4**B, the mouthpiece portion **430** can include one or more inserts **424**. The one or more inserts **424** can include first and second airflow outlet channels **426***a*, **426***b* that extend from corresponding first and second vapor inlets **435***a*, **435***b*, proximate the intersection of the mouthpiece portion **430** and the heater portion **441**, to corresponding first and second airflow outlets **428***a*, **438***b* at the cartridge proximal end **420***a*. The first and second airflow outlet channels **426***a*, **426***b* thereby form a fluid connection between the heater portion **441** and the first and second airflow outlets **428***a*, **428***b*, such that vapor generated in the heater portion **441** may be drawn towards a user at the cartridge proximal end **420***a*, and ultimately out of the first and second airflow outlets **428***a*, **428***b* as an inhalable aerosol. Proximate to the intersection of the mouthpiece portion **430** and the heater portion **441**, the insert **424** can further include first and second bypass channels **438***a*, **438***b* that each extend from corresponding first and second bypass air inlets **429***a*, **429***b* to corresponding first and second bypass outlets **427***a*, **427***b*, and thereby form a fluid connection between the first and second airflow outlet channels **426***a*, **426***b* and ambient air. In some implementations, the airflow outlet channels **426** and/or the bypass channels **438** can be created via a laser-cutting operation through walls of the insert **424** during the manufacturing process. It will be appreciated that the cross-sectional views of FIGS. **4**B-**4**P can be regarded as illustrating the bypass air inlets **429**, a portion of the bypass channels **438**, and the airflow outlets **428** in the locations labeled as the bypass air inlets **429**. However, the bypass air inlets **429** are illustrated and described for convenience.

[0342] It will be appreciated that the cross-sections are limited, and do not illustrate the fact that there are, for example, four bypass channels **438** (each with corresponding air inlets and outlets) in accordance with the implementation of FIGS. **4**A-**4**B. However, as described herein, there may be more or less bypass channels **438**, and the bypass channels **438** may take a different shape than what is illustrated. For example, each of the illustrated rectangular (cuboid) bypass channels **438** can be replaced with more and/or differently sized rectangular (cuboid) bypass channels **438** (see e.g., FIGS. **4**C, **4**G, **4**I). In other implementations, the illustrated rectangular (cuboid) bypass channels **438** can be replaced with a plurality of circular (cylindrical) bypass channels **438**, such as two, three, four, etc. circular (cylindrical) bypass channels **438**. In such implementations, if there are two airflow outlet channels **426**, each will have two sets of bypass channels **438**, and the cartridge **420** could therefore include eight, twelve, sixteen, etc. bypass channels **438**. Instead of the rectangular (cuboid) or circular (cylindrical) bypass channels **438**, other geometries of the bypass channels **438** can be created.

[0343] When a user draws on the mouthpiece portion **430** at the cartridge proximal end **420***a*, this can cause ambient air to enter the receptacle **418** of the device body **410** at the airflow inlets **434**, cause the air residing in the receptacle **418** to enter one or more inlets at the cartridge distal end **420***b*, and cause ambient air to enter the bypass air inlet(s) **429** at the same time. The air that enters the receptacle **418** from the airflow inlets **434** can travel along the airflow inlet path **432** to the cartridge distal end **420***a*, where it can continually flow into the one or more cartridge inlets located there. In some implementations, the plurality of ridges **446** can define the shape and size of the airflow inlets **434** into the receptacle **418**, as described in greater detail below.

[0344] The air that enters at the cartridge distal end **420***b* can subsequently pass through the vaporizable material **402** as it is heated to entrain the vaporized material generated within the heater chamber. Meanwhile, the air that entered the bypass air inlet(s) **429** can subsequently pass through the bypass channels **438** and out of their corresponding bypass outlets **427**, entering their respective airflow outlet channels **426**. The air that entrains the vaporized material in the heater chamber can subsequently pass into the vapor inlets **435**, entering the airflow outlet channels **426**. As the vapor and air from the heater portion **441** traverse the airflow outlet channels **426**, they mix with the ambient air that entered through the bypass air inlet(s) **429** to form an inhalable aerosol. The area in which the mixing and/or condensation occurs can be referred to as a condensation chamber. Accordingly, each of the airflow outlet channels **426** can include one or more condensation chambers configured to condense the entrained vapor with the ambient air to form at least a portion of the inhalable aerosol. This inhalable aerosol ultimately travels out of the airflow outlets **428** at the cartridge proximal end **420**a and into the mouth of a user. Accordingly, the plurality of airflow outlets **328** can be in fluid communication with the at least one condensation chamber in a corresponding one of the plurality of airflow outlets **328**, and/or configured to deliver the inhalable aerosol to a user. Collectively, the path of air, vapor, and inhalable aerosol through the vaporizer device **400** can be referred to as the airflow path of the vaporizer device **400**.

[0345] The one or more sensors **413** can include a pressure sensor, an accelerometer, a temperature sensor, measurement circuitry configured to measure properties of the various components of the vaporizer body **410** and/or cartridge **420**, and/or the like. In some implementations, the pressure sensor can be configured to detect changes in pressure that occur along the airflow path of the vaporizer device **400**. Detected pressure drops can be used to determine when a user is inhaling, which can in turn be used to increase the power applied to the heating element(s) **442** to maintain or increase the temperature of the heating element (s) **442**. Additionally or alternatively, the detected pressure drops can be used to count the number of puffs taken, which can in turn be used for other operations, such as stopping the application of power to the heating element(s) **442** (e.g., placing the vaporizer device **400** in a sleep or off state).

[0346] In some implementations, the one or more sensors **413** can include measurement circuitry configured to derive one or more properties of the heating element(s) **442** and/or inductor(s) **443**, such as resistance, inductance, and/or temperature. In some aspects, the measurement circuitry can include circuitry configured to directly measure the one or more properties and/or circuitry configured to estimate the one or more properties based on other data (e.g., obtained via direct measurement, obtained processed and/or filtered measurement data, obtained from memory, and/or the like). The resistance and/or inductance of the heating element(s) **442**, for example, can be used to estimate the temperature of the heating element(s). The resistance, inductance, and/or temperature can be used to maintain and/or alter the application of power to the heating element(s) **442**, such as to achieve a target temperature. For example, altering the application of power can include increasing or decreasing the total power applied to the inductor(s) **443** and/or heating element(s) **442**, adjusting a duty cycle of power applied to the inductor(s) **443** and/or heating element(s) **442**, and/or the like. A duty cycle of power applied to the heating element(s) **442** can include a defined (e.g., predetermined and/or dynamically determined) period of time during which power is applied and a defined (e.g., predetermined and/or dynamically determined) period of time during which power is not applied during a given cycle of time. In some implementations, a default duty cycle can include 48 milliseconds (ms) of applying power and 2 ms of not applying power, every 50 ms.

[0347] Within the period of time during which power is not applied, the resistance and/or inductance of the heating element(s) **442** can be derived. If the derived resistance, inductance, and/or temperature are above a respective threshold (e.g., target temperature), the period of time during which power is applied can be decreased and/or the period of time during which power is not applied can be increased, in order to maintain a stable temperature at the heating element(s) **442** (e.g., target temperature). If the derived resistance, inductance, and/or temperature are below the same or a different respective threshold (e.g., target temperature), the period of time during which power is applied can be increased (up to a maximum value, which can be the same as the default value) and/or the period of time during which power is not applied can be decreased (down to a minimum value, which can be the same as the default value). For example, the same period of time (e.g., the last 2 ms) in each duty cycle (50 ms) may always be dedicated to deriving the resistance and/or inductance of the heating element(s) **442**, regardless of the resistance, inductance, and/or temperature, and even if power is not being applied for a longer period of time.

[0348] However, in some implementations, the default duty cycle can be defined to apply power during the entire cycle of time (e.g., 50 ms out of each 50 ms), with measurements being taken at predetermined intervals (e.g., at the beginning or end of each duty cycle) regardless of whether power is being applied to the heating element(s) **442**. The default duty cycle can be adjusted to include a period of time during which power is not applied during the duty cycle, based on the measured or derived value(s). This can be achieved, for example, by providing separate driving circuitry (e.g., including one or more inductors **443**) and measurement circuitry (e.g., including a sensor **413**), as described herein. Although temperature control can be achieved based on controlling the application of power to the heating element(s) **442** according to duty cycles as described herein, additionally or alternatively temperature control can be achieved based on controlling the voltage applied to the inductor(s) **443** and/or heating element(s) **442**.

[0349] Implementations in which eddy currents are used to heat the vaporizable material **402**, such as by use of heating element(s) **442** comprising a susceptor formed from aluminum and/or another non-ferritic metal, closed loop temperature control can be implemented with greater accuracy. For example, in implementations where the heating element(s) **442** are in direct contact with the vaporizable material **402**, more accurate estimations of the current temperature of the vaporizable material **402** can be obtained and used in feedback loop temperature control, such as in accordance with the temperature control methodologies, components, circuitry, and/or the like described herein.

[0350] In some implementations, the measurement circuitry can be similar to the circuitry **973**a-e illustrated in FIGS. **9**A-**9**E. As illustrated in FIG. **9**A, the circuitry **973**a can include a power source AC (alternating current) (grounded) connected to a capacitor C, which is coupled with the inductive coil(s) **943** (LCOIL). As illustrated, the inductive coil(s) **943** can include an inductive component L and a resistive component R, although not necessarily physically formed from an inductor and a resistor (see FIGS. **5**A-**5**J for examples of the physical construction of LCOIL). The inductive coil(s) **943** can be coupled in series or in parallel with the capacitor C, depending on whether the power source simulates an AC voltage or an AC current. The end of the inductive coil(s) **943** that is not coupled with the capacitor C and/or power source can be coupled to ground. Sense circuit **913** can be coupled to each end of the inductive coil(s) **943** to measure the inductance L and the resistance R of the inductive coil(s) **943**, for use in the temperature control processes described herein.

[0351] In some implementations, temperature control can be implemented based on comparing derived (e.g., measured) inductive and/or restive values at different points in time and/or at different frequencies. For example, in some implementations the sense circuit **913** can be configured to measure or derive a first inductance L_A and/or a first resistance R_A of the inductive coil(s) **943** when AC power is not applied to the inductive coil(s) **943** by the power source AC, which can be referred to as measuring the inductance and/or resistance of the inductive coil(s) **943** at DC (direct current) (e.g., 0 Hz). Measuring at DC can reduce or eliminate the impact that the heating element(s) **442** have on the inductive coil(s) **943**. The sense circuit **913** can be further configured to measure a second inductance L_B and a second resistance R_B of the inductive coil(s) **943** at a time while power is being applied by the power source AC, such as when heating a heating element(s) **442** (not shown). These measurements can be taken to determine the effect that the heating element (s) **442** has on the inductive coil(s) **943**. These measurements can be taken at a specific frequency, such as within a range of 100 kHz to 1 MHz. Based on these measured values, the sense circuit **913** and/or other circuitry (e.g., a controller **104** in communication with the sense circuit **913**) can be configured to derive (e.g., estimate) the temperature of the heating element(s) **442**. For example, the ratio of resistance over inductance (e.g., R_C/L_C) caused by the heating element(s) **442** can be estimated based on the equation $(R_A-R_B)/(L_A-L_B)$. Because the inductance of the heating element(s) **442** generally does not change with temperature, the result of this equation (R_C/L_C) can be used with other information about the heating element(s) **442** and/or inductive coil(s) **943** to derive the temperature of the heating element(s) **442** at the time the measurements were taken. As described herein, the derived temperature of the heating element(s) **442** can be used to regulate the temperature of the heating element(s) **442**, such as by providing the same, more, or less power and/or for the same, longer, or shorter durations of time, which can be implemented to heat the heating element(s) **442** at or near a target temperature.

[0352] For example, in some implementations, the result of the equation (R_C/L_C) and a thermal coefficient of resistance (TCR) of the heating element(s) **442** can be combined to derive an estimated temperature of the heating element(s) **442**. The heating element(s) **442** can be manufactured such that it has a specific TCR, optionally with some level of tolerance. This specific TCR value and/or the tolerance can be stored in the vaporizer device **420**, such as in memory **108**, in the sense circuit **913**, and/or the like. In other implementations, the TCR of the heating element(s) **442** can be measured periodically and/or upon the occurrence of specific events, such as upon insertion of the heating element (s) **442** in the vaporizer body **410**, based on predetermined criteria such as a change of inductance and/or resistance over time or rate of change of inductance and/or resistance over time, before and/or after heating the heating element(s) **442**, at set intervals of time before and/or after heating the heating element(s) **442**, and/or the like.

[0353] In some implementations, a Curie temperature of the heating element(s) **442** can be utilized to maintain heat applied to the vaporizable material **402** in a particular range. A Curie temperature of an object can be regarded as a temperature at which particles of the object are substantially non-magnetic. For example, in implementations where the heating element(s) **442** is made of a nickel and iron alloy (e.g., Invar), the heating element **442** can be configured such that it does not reach higher than a known temperature (e.g., 240° C.). As such, the heating element(s) **442** can be regarded as self-regulating. Otherwise, the existence of metals with a known Curie temperature can be factored into the heater control methodologies described herein. For example, in some implementations, a controller **104** and/or other circuitry can be configured to monitor the heating element(s) **442** magnetic properties as it is transitioning to its Curie temperature, and regulate the heating element(s) **442** such that it stays at or near its Curie temperature. For example, the controller **104** can be configured to decrease the application of power and/or energy to the heating element(s) **442** when it is at or near its Curie temperature such that additional power and/or energy is not wasted.

[0354] In various implementations, depending on the shape of the heating element(s) **442**, multiple inductive coils **943** can be used to heat the heating element(s) **442**. For example, one inductive coil **943** can be used to generate an electromagnetic field to heat each of two opposing long sides of the heating element(s) **442**. In other implementations, sets of two, three, four, five, six, or more inductive coils **943** can be used to generate electromagnetic fields to each heat two opposing long sides of the heating element(s) **442** (see FIGS. **5A-5J** for examples of the physical construction and/or locations of the inductive coils **943**).

[0355] When multiple inductive coils **943** are implemented, each can be configured to operate at the same frequency and/or different frequencies. For example, in some implementations all of the inductive coils **943** can be configured, via their structure and/or corresponding circuitry such as a controller **104**, to operate at substantially the same operating frequency, which can change over time. All of the inductive coils **943** can be configured to operate at a first frequency when power is not being applied to heat the heating element(s) **442** (which can be 0 Hz), at a second frequency when power is being applied to heat the heating element(s) **442** in a first heating mode (e.g., during a pre-heating mode, a standby mode, a normal power mode, and/or the like), and/or at a third frequency when power is being applied to heat the heating element(s) **442** in a second heating mode (e.g., where more power is applied relative to the first heating mode, such as in a normal power mode, a boost power mode, and/or the like).

[0356] In other implementations, one or more of the inductive coils **943** can be configured to operate at a different frequency or frequencies from the remaining inductive coils **943**. In accordance with these implementations, the inductive coils **943** can be configured to operate at substantially the same frequency during certain times or modes while also being configured to operate at different frequencies during certain times or modes. For example, in implementations where sets of two or more inductive coils **943** are provided to respectively heat opposing sides of the heating element(s) **442**, one of the inductive coils **943** or one of the inductive coils **943** from each set can be configured to operate at a different frequency while the remaining inductive coils **943** operate at the same frequency. With each of the inductive coils **943** being positioned near different portions of the heating element(s) **442**, information derived from the inductive coil **943** (or coils) operating at a different frequency can be used to derive additional information about the heating element(s) **442**.

[0357] In implementations where one inductive coil **943** is used to heat each of the long sides of the heating element(s) **442**, each of the inductive coils **943** can be configured to operate at substantially the same frequency (F_A) during certain modes and/or times, and each of the inductive coils **943** can be further configured to operate at a different frequency (F_B) during other modes and/or times. For example, a first inductive coil **943** $LCOIL_A$ that is near side "A" of the heating element(s) **442** and a second inductive coil **943** $LCOIL_B$ that is near side "B" of the heating element(s) **442** can, during a first Mode/$Time_1$ be configured to both operate at frequency F_A. During a second Mode/$Time_2$ the first inductive coil **943** $LCOIL_A$ can be configured to operate at frequency F_B while the second inductive coil **943** $LCOIL_B$ can be configured to remain operating at frequency F_A. During a third Mode/$Time_3$ the first inductive coil **943** $LCOIL_A$ can be configured to operate at frequency F_A while the second inductive coil **943** $LCOIL_B$ can be configured to operate at frequency F_B. During each of the Modes/Times, measurements of the properties of the inductive coils **943** can be taken, such as inductance and/or resistance measurements. These measurements can be compared against expected values for the measurements to derive additional information about the heating element **442**, such as whether the heating element **442** is deformed. For example, if some combination of the inductance and/or resistance measurements taken during the second Mode/$Time_2$ differ from the same combination of the inductance and/or resistance measurements taken during the third Mode/$Time_3$, then it can be concluded that the heating element **442** is deformed on side A or side B of the heating element **442**. Although two Frequencies $F_{A,B}$ are discussed, additional frequencies can be applied during heating and/or measurement of the heating element(s) **442**, such as Frequencies F_{A-N}.

[0358] Frequency F_A can be a frequency at which the heating element(s) **442** is heated to vaporize the vaporizable material **402**. However, frequency F_A can alternatively be a frequency at which the heating element(s) **442** is not heated to vaporize the vaporizable material **402**. For example, frequency F_A can be a frequency that is lower than the frequency at which the heating element(s) **442** is heated. Frequencies F_{B-N} can additionally or alternatively include a frequency at which the heating element(s) **442** is heated, a frequency at which the heating element(s) **442** is not heated (e.g., lower or higher frequencies than the frequency at which the heating element(s) **442** is heated), and/or can be adjusted dynamically based on measurements of the heating element(s) **442** and/or the like. In various implementations, Frequencies F_A, F_B, etc. are within a range of 0 Hz to 1 MHz. In order to derive more information about the heating element(s) **442**, additional distinct frequencies can be used. For example, measurements can be taken while operating one or more of the inductive coils **943** at approximately 50 kHz, 100 kHz, 150 kHz, 200 kHz, 250 kHz, 300 kHz, 350 kHz, 400 kHz, 500 kHz, etc. (e.g., in ranges of ±5 kHz, ±10 kHz, ±15 kHz, etc.).

[0359] In some implementations, multiple inductive coils **943** may be disposed near each of side A and/or side B of the heating element(s) **442**. For example, in accordance with TABLES 1-3 below, $LCOIL_{A1}$ and $LCOIL_{A2}$ may be disposed near side A and $LCOIL_{B1}$ and $LCOIL_{B2}$ may be disposed near side B. In accordance with these example implementations, each of the inductive coils **943** can be driven at different frequencies and/or at different times. At some of all of the time frames and/or frequencies, the inductive coils **943** can be used to derive information about the heating element(s) **442**, as described herein.

[0360] As shown in TABLE 1, all of the inductive coils **943** can be configured to start in mode/$time_1$ at Frequency F_A, and sequentially for each mode/$time_{2-5}$ thereafter, only one of the inductive coils **943** operates at Frequency F_B while the remainder operate at the original F_A. In some implementations, the pattern of sequential changing frequencies can be repeated with F_B being a different value, such as by cycling through a repeating sequence of frequencies F_{B-N}.

TABLE 1

Inductive Coil 943	Mode/ $Time_1$	Mode/ $Time_2$	Mode/ $Time_3$	Mode/ $Time_4$	Mode/ $Time_5$
$LCOIL_{A1}$	F_A	F_B	F_A	F_A	F_A
$LCOIL_{A2}$	F_A	F_A	F_B	F_A	F_A
$LCOIL_{B1}$	F_A	F_A	F_A	F_B	F_A
$LCOIL_{B2}$	F_A	F_A	F_A	F_A	F_B

[0361] As shown in TABLE 2, all of the inductive coils **943** can be configured to start in mode/$time_1$ at Frequency F_A, and sequentially for each mode/$time_{2-5}$ thereafter, only one of the inductive coils **943** operates at a different frequency while the remainder operate at the original F_A. In accordance with the implementation in TABLE 2, each of the inductive coils **943** sequentially operate across a plurality of Frequencies F_{B-N}.

TABLE 2

Inductive Coil 943	Mode/ $Time_1$	Mode/ $Time_2$	Mode/ $Time_3$	Mode/ $Time_4$	Mode/ $Time_5$
$LCOIL_{A1}$	F_A	F_{B-N}	F_A	F_A	F_A
$LCOIL_{A2}$	F_A	F_A	F_{B-N}	F_A	F_A
$LCOIL_{B1}$	F_A	F_A	F_A	F_{B-N}	F_A
$LCOIL_{B2}$	F_A	F_A	F_A	F_A	F_{B-N}

[0362] As shown in TABLE 3, all of the inductive coils **943** can be configured to start in mode/$time_1$ at Frequency F_A, and sequentially for each mode/$time_{2-5}$ thereafter, a plurality of the inductive coils **943** operate at a different frequency F_B while the remainder operate at the original F_A. In accordance with the implementation in TABLE 3, each of the inductive coils **943** can operate at Frequency F_B at the same time as an inductive coil **943** on the same side or an opposite side therefrom. It will be appreciated that a larger number of inductive coils **943** and/or measurements taken at different frequencies can increase the accuracy the system, such as by making more precise determinations as to the location of a deformation, for example.

TABLE 3

Inductive Coil 943	Mode/ $Time_1$	Mode/ $Time_2$	Mode/ $Time_3$	Mode/ $Time_4$	Mode/ $Time_5$
$LCOIL_{A1}$	F_A	F_B	F_A	F_B	F_A
$LCOIL_{A2}$	F_A	F_A	F_B	F_B	F_A

TABLE 3-continued

Inductive Coil 943	Mode/ $Time_1$	Mode/ $Time_2$	Mode/ $Time_3$	Mode/ $Time_4$	Mode/ $Time_5$
$LCOIL_{B1}$	F_A	F_B	F_A	F_A	F_B
$LCOIL_{B2}$	F_A	F_A	F_B	F_A	F_B

[0363] As such, various measurements of the heating element(s) **442** can be taken while the heating element(s) **442** is being actively heated and/or while the heating element(s) **442** is not actively heated. Measurements of the heating element(s) **442** can be taken while the heating element(s) **442** is actively heated in a normal power mode, a boost power mode, and/or the like. In some implementations, an inductive coil that is actively heating the heating element(s) **442** to vaporize the vaporizable material **402** in a normal power mode can be configured to operate in a frequency range of 100 kHz to 200 kHz or 250 kHz to 350 kHz. An inductive coil that is actively heating the heating element(s) **442** to vaporize the vaporizable material **402** in a boost power mode can be configured to operate in a frequency range that higher than the frequency range in the normal power mode, such as greater than 200 kHz or greater than 350 kHz, and optionally less than 500 kHz. Measurements of the heating element(s) **442** can be taken while the heating element(s) **442** may or may not be actively heated, such as in a cartridge detection mode, a pre-heating mode, a measurement mode, a standby mode, and/or the like.

[0364] In some implementations, an inductive coil **943** that is operating in a measurement mode can be configured to operate at a plurality of different frequencies and/or frequency ranges while not actively heating the heating element(s) **442** to vaporize the vaporizable material **402**. Information sensed or measured through the inductive coil **943** in this mode can be used to determine whether there are any irregularities and/or deformations in the heating element (s) **442**. In various implementations, only a portion of the inductive coils **943** may be operating in the measurement mode while the remainder of the inductive coils **943** are operating in a normal power mode or boost power mode. Depending on a level and/or location of deformation detected, the vaporizer device **400** (e.g., via the controller **104**) can be configured to compensate for the deformation, prevent activation of the inductive coils **943**, provide an indication to the user that a deformed heating element **442** and/or cartridge **420** has been detected (e.g., via one or more outputs **117**, such as one or more LEDs), and/or the like. In some implementations, compensating for the deformation can include applying more or less power to the area of the heating element **442** that has been determined to be deformed.

[0365] In some implementations, an inductive coil **943** that is operating in a cartridge detection mode can be configured to operate at a plurality of different frequencies and/or frequency ranges while not actively heating the heating element(s) **442** to vaporize the vaporizable material **402**. Information sensed or measured through the inductive coil **943** in this mode can be used to determine whether an object present in the vaporizer device **420**, such as heating element(s) **442**, have certain defined properties of an object designed for use with the vaporizer device **420**. If and when heating element(s) **442** having the correct properties are detected, the vaporizer device **420** can be configured to allow the inductive coils **943** to operating in a normal power mode and/or boost power mode. If an object is detected but does not have one or more of the defined properties, then the inductive coil **943** may be disabled from heating. In some implementations, a defined property of the heating element (s) **442** can be an inductance measurement and/or resistance measurement.

[0366] In some implementations, an inductive coil **943** that is operating in a pre-heating mode can be configured to operate at one or a plurality of different frequencies to bring the heating element(s) **442** to a temperature that is suitable for vaporization. Additionally or alternatively, the pre-heating mode can include selectively heating different portions of the heating element(s) **442** to drive off at least a portion of the water vapor in the vaporizable material **402**. If a user inhales on the vaporizer device **420** when the aerosol has a higher water vapor content, such as in the first few inhalations, the user may experience a taste that is less pleasant. Accordingly, it can be beneficial to drive off as much of the water vapor content as possible, prior to a user inhaling on the vaporizer device **400**. In some implementations, user activation of the pre-heating mode may automatically occur when a user activates the device, such that the pre-heating mode is always executed prior to a normal power mode or a boost power mode.

[0367] Although various frequencies and modes are discussed with respect to the inductive coils **943** specifically, it is contemplated that other measurement circuitry, such as one or more of the sensing coils **513** discussed with respect to FIGS. **5A**-**5J**, can optionally be provided and configured to additionally or alternatively measure the heating element (s) **442**. For example, the measurement circuitry can be configured to measure information about the heating element(s) **442** during a normal power mode, boost power mode, measurement mode, cartridge detection mode, preheating mode, standby mode, and/or the like. In implementations where such measurement circuitry is present (e.g., one or more sensing coils **513**), the measurement circuitry may be configured such that it measures the restiveness, inductance, temperature, and/or other properties of the heating element(s) **442**, such as at one or a plurality of different frequencies, does not generate an electromagnetic field for heating the heating element(s) **442**, operates while the inductive coils **943** are heating the heating element(s) **442**, operates while the inductive coils **943** are not heating the heating element(s) **442**, and/or the like.

[0368] In some implementations, information about the inductive coils **943**, such as their inductance, resistance, temperature, and/or the like can be measured in one or more of the described modes and used to control the power or voltage applied, such as to heat the heating element(s) **442** at different temperatures (e.g., target temperatures), as described herein. Although reference is made to the long sides of the heating element(s) **442**, other configurations are contemplated depending on the shape and/or position of the heating element(s) **442**.

[0369] Other implementations exist where additional or alternative information about the inductive coil(s) **943** can be measured and/or used to estimate the temperature of the heating element(s) **442**, such as via the circuitry **973*b*** illustrated in FIG. **9**B. In such implementations, the temperature and/or other properties of the inductive coil(s) **943** can be measured by a coil temperature sensor **983** in close proximity to the inductive coil(s) **943**. In some implementations, the coil temperature sensor can include a thermistor, a PTC circuit such as a PTC thermistor, an NTC circuit such as an NTC thermistor, a thermocouple, and/or the like. In accordance with such implementations, the sense circuitry **913** and/or other circuitry can be configured to regulate the application of power to the heating element(s) **442**, based on a detected temperature of the inductive coil(s) **943**, in addition to or alternatively from the measured inductance and resistance. For example, a specific, detected rise in temperature of the inductive coil(s) **943** can be correlated to a rise in temperature of the heating element(s) **442**, such that the power and/or energy applied to the heating element(s) **442** can be reduced and/or maintained.

[0370] Other implementations exist where information about the inductive coil(s) **943** can be measured and/or used to estimate the temperature of the heating element(s) **442** in a different manner, such as via the circuitry **973***c* illustrated in FIG. **9**C. In such implementations, the inductive coil(s) **943** can be part of the driving circuitry (for heating the heating element(s) **442**)) and the sense circuit **913** is part of a different circuit. In operation, the sense circuit **913** is instead configured to measure properties of the inductive coil(s) **943** and/or heating element(s) **442** wirelessly (e.g., without direct, wired connection), such as through a connected sense coil. Additionally or alternatively, the implementations of FIG. **9**C can be configured to operate with the use of a coil temperature sensor **983** as described herein, such as via the circuitry **973***d* illustrated in FIG. **9**D.

[0371] In some implementations, the sense circuit **913** can be configured to communicate wirelessly with the driving circuitry such that it does not impact performance of the inductive coil(s) **943**, such as via the circuitry **973***e* illustrated in FIG. **9**E. For example, a resonant circuit formed of the capacitor C and connected inductive coil(s) **943** can operate in accordance with a known or measurable resonant frequency, and can be used to wirelessly power the heating element(s) **442** and/or measure information about the heating element(s) **442**, such as inductance and/or resistance. In some implementations, the inductance and/or resistance of the heating element(s) **442** can be determined based on measuring the resonant frequency of the inductive coil(s) **943** and comparing the measurements against the known resonant frequency of the inductive coil(s) **943** (e.g., without the presence of the heating element(s) **442**). For example, the measurements can be implemented via monitoring and/or measuring the ringing of the inductive coil(s) **943**. In some implementations, information about the heating element(s) **442** can be measured and/or determined based on the time and/or speed at which the oscillation of an alternating current (e.g., sine wave) used to power the heating element(s) **442** stops (e.g., returns to zero). Such techniques can be beneficial by providing much faster measurements (e.g., in the order of microseconds) compared with determinations that require more direct measurements of the inductance and/or resistance of the heating element(s) **442**.

[0372] In some implementations, the inductive coils **943** can be configured to measure information from something other than the heating element **442**, such as for the purposes of calibration and/or estimation. For example, an inductive coil **943** that is operating in a calibration mode can be configured to operate at a plurality of different frequencies and/or frequency ranges when a heating element(s) **442** is not present. Information sensed or measured through the inductive coils **943** in this mode can be used to determine an expected change in inductance and/or resistance, which can be stored in a look-up table for use in monitoring the inductive coils when a heating element(s) **442** is present. The sensed information can come from operation of another inductive coil **943**, such one or more inductive coils **943** on an opposing side of the vaporizer device **420**. For example, in some implementations, one or more of the inductive coils **943** (e.g., all) can be configured to heat each other up to a predetermined temperature and/or for a predetermined amount of time, and the inductance and/or resistance can be measured and/or stored for each of the one or more inductive coils **943**. The data derived from this monitoring can be used to define one or more parameters of each inductive coil(s) **943**, which can be factored into the temperature control methodologies described herein. In some implementations, this calibration mode can be implemented as part of a manufacturing process and/or periodically after the device has been sold (e.g., be a recommended user-selectable mode).

[0373] Returning to FIG. **4**A, the one or more inductors **443** can be configured to generate an electromagnetic field, and the one or more flux concentrators **448** can be configured to direct the electromagnetic field towards the one or more heating elements **442**, as described in greater detail below. When the one or more heating elements **442** receive the electromagnetic field, they can be configured to convert the current to heat, in order to heat the vaporizable material **402**.

[0374] In implementations where only one airflow outlet channel **426** is included, such as through the insert **424** in the mouthpiece portion **430** as illustrated in the vaporizer device **400***c* of FIG. **4**C, the airflow outlet channel **426** can be longer along the cartridge **420** width compared to each individual airflow outlet channel **426** if two or more airflow outlet channels **426** are included. Providing a singular airflow outlet channel **426** can provide an aerosol that is more homogenous compared to two separate airflow outlet channels **426**. Separately, providing a larger airflow outlet channel **426** and/or a larger mixing chamber or a greater degree or tortuosity in the aerosol outlet path can increase the residence time the vapor and air spend within the airflow outlet channel **426**, as well as increase contact with cooler surfaces, which can help to cool the resulting aerosol to an even lower temperature and promoting proper aerosol formation (e.g., nucleation). As used to herein, proper aerosol formation can refer to formation of an aerosol that is desirable to a user (e.g., is not too hot, does not include larger particles, provides a particular sensation in the mouth, etc.).

[0375] As with the vaporizer device **400***a* of FIG. **4**A, bypass air inlet(s) **429** may be disposed on both major faces of the cartridge **420** (i.e., the faces separated by the cartridge **420** depth) that are in fluid communication with the singular airflow outlet channel **426** of FIG. **4**C. Each of the two sets of bypass channels **438** may include one or more rectangular (cuboid) bypass channels **438**, one or more circular (cylindrical) bypass channels **438**, and/or one or more bypass channels **438** of other geometries. In some implementations, the bypass channels **438** can be offset from each other along the cartridge **420** length and the cartridge **420** width to generate turbulence within the airflow outlet channel (see FIG. **4**I). Such turbulence can further promote mixing of air and vapor in the generation of the inhalable aerosol. The vaporizer device **400**, **400***c* can include at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***c* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**B and/or **4**D-**4**Q, except as noted or where impractical.

[0376] In implementations where differently shaped airflow outlet channels **426** are included, such as through one or more inserts **424** in the mouthpiece portion **430** as illustrated in the vaporizer device **400***d* of FIG. **4**D, the airflow outlet channels **426** can be different distances along the cartridge **420** width. For example, as illustrated first and second airflow outlet channels **426***a*, **426***b* can be disposed in a lower region of the mouthpiece portion **430** (e.g., closer to the cartridge distal end **420***b* and further from the cartridge proximal end **420***a*, along the cartridge **420** length) and a third airflow outlet channel **426***c* can be disposed in an upper region of the mouthpiece portion **430** (e.g., closer to the cartridge proximal end **420***a* and further from the cartridge distal end **420***b*, along the cartridge **420** length).

[0377] Advantages with this configuration exist compared to using the two independent airflow outlet channels **426** in the vaporizer device **400***a* of FIGS. **4**A-**4**B or the individual airflow outlet channel **426** in the vaporizer device **400***c* of FIG. **4**C. For example, the individual benefits of each can be attained together. When the air and vapor from the heater portion **441** enter the independent first and second airflow outlet channels **426***a*, **426***b* and mix with ambient air from their respective bypass air inlet(s) **429**, the smaller fluid volumes provide a better restriction to draw and spaces in which a larger overall portion of the vapor is able to independently mix with ambient air, helping to cool the air and vapor faster. Thereafter, when the air and vapor enter the larger third airflow outlet channel **426***c*, aerosol generation can benefit from the increased residence time within the third airflow outlet channel **426***c*, helping the air and vapor to cool for longer, and provide for better mixing that results in a more homogenous aerosol. Further, the change in size between the smaller and larger airflow outlet channels **426** can introduce turbulence to help promote mixing, provide a longer and/or more tortuous airflow path to increase cooling time, and therefore promote proper aerosol formation.

[0378] In some implementations, the first and second airflow outlet channels **426***a*, **426***b* can be channels within a first insert **424** and the third airflow outlet channel **426***c* can be a channel within a second insert **424**. The first insert **424** can be stacked on top of the second insert **424**, along the cartridge **420** length in a direction from the cartridge distal end **420***b* to the cartridge proximal end **420***a*. The first and second inserts **424** can also be held together to form the mouthpiece portion **430** (e.g., held within a layer of material, wrapped together within a wrapper **422**, and/or the like), and an additional layer of material (e.g., wrapper **422**) can be included that holds the mouthpiece portion **430** together with the heater portion **441**. The vaporizer device **400**, **400***d* can include at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***d* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**C and/or **4**E-**4**Q, except as noted or where impractical.

[0379] Although the first and second outlet channels **426***a*, **426***b* are illustrated in FIG. **4**D as being in fluid communication with a singular, larger third airflow outlet channel **426***c*, each of the first and second outlet channels **426***a*, **426***b* can alternatively be in fluid communication with their own, separate and respective larger third and fourth airflow outlet channels **426***c*, **426***d* as illustrated in FIG. **4**Q. As such, various implementations of the cartridges **420** described herein can include more controlled regions in which the vaporized material mixes with ambient air for cooling and/or promotion of proper aerosol formation. As further illustrated in FIG. **4**Q, each of the first and second outlet channels **426***a*, **426***b* can be provided with two bypass air inlets **429** each, resulting in a cartridge **420** with eight bypass air inlets **429** total.

[0380] Other implementations exist where differently shaped airflow outlet channels **426** are included, such as through one or more inserts **424** in the mouthpiece portion **430** as illustrated in the vaporizer device **400***e* of FIG. **4**E. For example, as illustrated a first airflow outlet channel **426***a* can be disposed in a lower region of the mouthpiece portion **430** (e.g., closer to the cartridge distal end **420***b* and further from the cartridge proximal end **420***a*, along the cartridge **420** length) and second and third airflow outlet channels **426***b*, **426***c* can be disposed in an upper region of the mouthpiece portion **430** (e.g., closer to the cartridge proximal end **420***a* and further from the cartridge distal end **420***b*, along the cartridge **420** length).

[0381] Advantages with this configuration exist compared to using the two independent airflow outlet channels **426** in the vaporizer device **400***a* of FIGS. **4**A-**4**B or the individual airflow outlet channel **426** in the vaporizer device **400***c* of FIG. **4**C. For example, the individual benefits of each can be attained together. When the air and vapor from the heater portion **441** enter the first airflow outlet channel **426***a* and mix with ambient air from the bypass air inlet(s) **429**, aerosol generation can benefit from the increased residence time within the first airflow outlet channel **426***a*, helping the air and vapor to cool for longer, and provide for better mixing that results in a more homogenous aerosol. Thereafter, when the air and vapor enter the smaller, independent second and third airflow outlet channels **426***b*, **426***c*, the smaller fluid volumes provide a better restriction to draw and are easier to control. Separately, the presence of the two smaller volumes after the larger volume can help to introduce turbulence to help promote mixing, provide a longer and/or more tortuous airflow path to increase cooling time, and therefore promote proper aerosol formation.

[0382] In some implementations, the first airflow outlet channel **426***a* can be a channel within a first insert **424** and the second and third airflow outlet channels **426***b*, **426***c* can be channels within a second insert **424**. The first insert **424** can be stacked on top of the second insert **424**, along the cartridge **420** length in a direction from the cartridge distal end **420***b* to the cartridge proximal end **420***a*. The first and second insert **424** can also be held (e.g., wrapped) together within a layer of material (e.g., wrapper **422**) so that they may form the mouthpiece portion **430** (e.g., held within a layer of material, wrapped together within a wrapper **422**, and/or the like), and an additional layer of material (e.g., wrapper **422**) can be included that holds the mouthpiece portion **430** together with the heater portion **441**. The vaporizer device **400**, **400***e* can include at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***e* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**D and/or **4**F-**4**Q, except as noted or where impractical.

[0383] Other implementations exist where additional and/or different inserts **424** are included, such as the first and second inserts **424***a*, **424***b* in the mouthpiece portion **430** as illustrated in the vaporizer device **400***f* of FIG. **4**F. For example, as illustrated first insert **424***a* can be disposed in a lower region of the mouthpiece portion **430** (e.g., closer to the cartridge distal end **420***b* and further from the cartridge proximal end **420***a*, along the cartridge **420** length) and the second insert **424***b* can be disposed in an upper region of the mouthpiece portion **430** (e.g., closer to the cartridge proximal end **420***a* and further from the cartridge distal end **420***b*, along the cartridge **420** length).

[0384] The first and second airflow outlet channels **426***a*, **426***b* can be channels within a first insert **424***a* and a second insert **424***b* can be positioned downstream of the airflow outlet channels **426**. The second insert **424***b* can be stacked on top of the first insert **424***a*, along the cartridge **420** length in a direction from the cartridge distal end **420***b* to the cartridge proximal end **420***a*. The first and second inserts **424***a*, **424***b* can also be held together to form the mouthpiece portion **430** (e.g., held within a layer of material, wrapped together within a wrapper **422**, and/or the like), and an additional layer of material (e.g., wrapper **422**) can be included that holds the mouthpiece portion **430** together with the heater portion **441**.

[0385] In some implementations, the second insert **424***b* can include an air-permeable material such that aerosol may exit the mouthpiece portion **430** and be inhaled by a user, but may provide additional filtration (e.g., active filtration to remove constituent parts of the aerosol). The second insert **424***b* can include material such as one or more of paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic (e.g., PET), cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like. The vaporizer device **400**, **400***f* can include at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***f* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**E and/or **4**G-**4**Q, except as noted or where impractical.

[0386] Other implementations exist where the insert(s) **424** take up a smaller percentage of the volume in the mouthpiece portion **430** and/or other components are used instead as illustrated in the vaporizer device **400***g* of FIG. **4**G. For example, one or more inserts **424** can be disposed in an upper region of the mouthpiece portion **430** (e.g., closer to the cartridge proximal end **420***a* and further from the cartridge distal end **420***b*, along the cartridge **420** length) and a divider **454** can be disposed in a lower region of the mouthpiece portion **430** (e.g., closer to the cartridge distal end **420***b* and further from the cartridge proximal end **420***a*, along the cartridge **420** length). As described herein, the divider **454** can be regarded as part of the mouthpiece portion **430** or part of a separate divider portion. In some implementations, at least a portion of the divider portion can be disposed within the receptacle **418** when the cartridge **420** is inserted into the vaporizer body **410** and/or at least a portion of the divider portion can be disposed outside of the receptacle **418** when the cartridge **420** is inserted into the vaporizer body **410**. As illustrated, one or more walls **433** can be provided within the mouthpiece portion **430** to maintain the rigidity of the mouthpiece portion **430** so that it is resistant to deformation under force (e.g., crumpling, breaking, etc.) and/or easier to manufacture. As illustrated, the wall(s) **433** can extend along the cartridge **420** length, between the insert(s) **424** and the divider **454** (e.g., in the region downstream of the divider **454** and upstream of the insert **424**). The wall(s) **433** define at least a portion of a perimeter of the airflow outlet channel **426**, and in some implementations, the wall(s) **433** define substantially all of the perimeter of the airflow outlet channel **426**. In some implementations, the airflow outlet channel **426** can be formed between and/or defined by the wall(s) **433** and the insert(s) **424**, and optionally by the divider **454** in implementations where the wall(s) **433** form a hollow shape (e.g., a hollow, flattened cylinder).

[0387] In some implementations, the divider **454** can include a solid end, define an open end opposite the solid end, and include a solid boundary that extends between the two ends (e.g., along a perimeter of the divider **454**, where the perimeter can be substantially the same at the solid end and the open end). As illustrated, the divider **454** can be disposed within the mouthpiece portion **430** with the solid end more proximate the cartridge proximal end **420***a* and the open end more proximate the cartridge distal end **420***b*, facing the heater chamber in the heater portion **441**. In some aspects, the divider **454** can be regarded as having an upside-down cup shape (relative to the cartridge distal end **420***b* being considered the ground). A plurality of vapor inlets **435** can be formed through the solid end of the divider **454**, such that the vaporized material and external air from the heater chamber may enter the airflow outlet chamber **426**.

[0388] In some implementations, the walls **433** can similarly include a solid end, define an open end opposite the solid end, and include a solid boundary that extends between the two ends (e.g., along a perimeter of the walls **433**, where the perimeter can be substantially the same at the solid end and the open end). As illustrated, the divider **454** can be disposed within the mouthpiece portion **430**, with the open end more proximate the cartridge proximal end **420***a* and the closed end more proximate the cartridge distal end **420***b*. In some aspects, the walls **433** can be regarded as having a cup shape. A plurality of bypass air inlets **429** can formed through the solid boundary of the walls **433**, such that ambient air may enter the airflow outlet chamber **426**. Further, a plurality of vapor inlets **435** can be formed through the solid end of the walls **433**, such that the vaporized material and external air from the heater chamber, and more immediately, from the vapor inlets **435** of the divider **454**, may enter the airflow outlet chamber **426**.

[0389] In some implementations the solid end of the walls **433** can abut (e.g., physically touch and/or in proximity to) the solid end of the divider **454**, which can help to simplify the manufacturing process. In some implementations, the vapor inlets **435** and the bypass air inlets **429** formed in the divider **454** and the walls **433** can be sized to create a jet-stream effect. For example, in some implementations, each of the vapor inlets **435** and the bypass air inlets **429** can be circular holes that are less than 1 mm in diameter, less than 0.5 mm in diameter, or less than 0.25 mm in diameter. In some implementations, each of the vapor inlets **435** and the bypass air inlets **429** are the same size. However, in other implementations, the vapor inlets **435** are larger than the bypass outlets **427**, such that the jet stream effect from the ambient air has a stronger effect on the slower-moving air passing through the vapor inlets **435**. The vapor inlets **435** and the bypass air inlets **429** can be created via a laser-cutting operation during the manufacturing process.

[0390] In some implementations, the divider **454** may extend out of the distal end of the mouthpiece portion **430** such that it may couple with, be inserted within, and/or touch the exterior of the heater portion **441**. In accordance with these implementations, the divider **454** can be regarded as part of the mouthpiece portion **430** only, as part of both the mouthpiece portion **430** and the heater portion **441**, or may be regarded as an intermediate portion disposed between the mouthpiece portion **430** and the heater portion **441**. For example, in some implementations the insert(s) **424**, wall(s) **433**, and the divider **454** can all be held (e.g., wrapped) together in a first layer of material (e.g., wrapper **422**) to form the mouthpiece portion **430**, the heating element(s) **442** can be disposed around the vaporizable material **402** to form the heater portion **441**, and an additional layer of material (e.g., wrapper **422**) can hold the mouthpiece portion **430** and the heater portion **441** together to form the cartridge **420**.

[0391] The insert **424** can include an air-permeable material such that aerosol may exit the mouthpiece portion **430** and be inhaled by a user, but may provide additional filtration (e.g., active filtration to remove constituent parts of the aerosol). The insert **424** can include material such as one or more of paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic (e.g., PET), cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like.

[0392] The vaporizer device **400**, **400***g* can include the at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***g* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**F and/or **4**H-**4**Q, except as noted or where impractical.

[0393] Other implementations exist where one or more insert(s) **424** can be disposed within the heater portion **441**, as illustrated in the vaporizer device **400***h* of FIG. **4**H. For example, one or more first inserts **424***a* can be disposed in a lower region of the heater portion **441** (e.g., proximate and/or forming at least a portion of the cartridge distal end **420***b*). The first insert(s) **424***a* can include material that is air-permeable so that air may enter the heater chamber through the material, such as one or more of paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic (e.g., PET), cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like.

[0394] In some implementations, an end cap may instead be disposed in the location of the first insert(s) **424***a*, and may comprise one or more cartridge inlets (e.g., as discussed with respect to FIG. **4**A). As disclosed above, the end cap can refer to at least one of a variety of materials and/or elements that are positioned adjacent a side of vaporizable material and/or a container for containing vaporizable material within any implementation of the cartridge disclosed herein. In some implementations, the end cap can be positioned at an end of the cartridge. In some implementations, the end cap can be positioned offset (e.g., along the length of the cartridge) from an end of the cartridge, including not being a most distal or proximal element along an implementation of the cartridge. For example, the end cap can form a part of an outer surface of the cartridge and/or the end cap can be fully contained within the outer surface of the cartridge. The vaporizer device **400**, **400***h* can include at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***h* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**G and/or **4**I-**4**Q, except as noted or where impractical.

[0395] Other implementations exist where multiple bypass air inlets **429** are offset from each other to create a turbulent airflow, such as those illustrated in the vaporizer device **400***i* of FIG. **4**I. As described herein, the cartridge **420** can include one or more airflow outlet channels **426** in fluid communication with ambient air through at least one bypass air inlet **429** formed on each of the long sides of the cartridge **420**. As illustrated, the cartridge **420** can include first and second airflow outlet channels **426***a*, **426***b*, each with their own respective set of first and second bypass air inlets **429***a*, **429***b*, on a first long side of the cartridge **402**. As illustrated, each subsequent bypass air inlet **429**, in the direction of the cartridge airflow, can be offset from the prior bypass air inlet **429** (on an exterior face of the cartridge **420**) along the cartridge **420** length and/or the cartridge **420** width. Stated another way, as the external air and vapor pass through each airflow outlet channel **426**, they can be joined and/or disrupted by a sequence of ambient air streams that are sequentially offset from each other by an angle formed between the cartridge **420** length and the cartridge **420** width (e.g., other than 90 degrees, such as between 50 degrees and 40 degrees, between 60 degrees and 30 degrees, between 70 degrees and 20 degrees, between 80 degrees and 10 degrees, and/or the like). It will be appreciated that such placement of the bypass air inlets **429** can introduce turbulence into the cartridge airflow path and/or within the one or more condensations chambers, which can promote cooling and/or condensation of the vapor into the inhalable aerosol.

[0396] Matching sets of bypass air inlets **429** can exist on the second long side of the cartridge **402** (not shown), however other patterns can exist between the first and second sides of the cartridge **420**. For example, while one side of the cartridge can include the three bypass air inlets **429** shown, the other side of the cartridge can include only two bypass air inlets that are staggered and/or disposed within the spaces between the illustrated three bypass air inlets **429**, offset along the cartridge **420** depth, or four bypass air inlets **429** that are offset in a similar manner. In other implementations, the number of bypass air inlets **429** on each side can be the same, and the pattern can be the same or different. For example, while the subsequent bypass air inlets (along the direction of the cartridge airflow) of the sets of first and second bypass air inlets **429***a*, **429***b* are illustrated as alternating between being closer to the center of the long sides and further from the center of the long sides (but still bounded by the locations of the respective first and second airflow outlet channels **426***a*, **426***b*), the pattern of the bypass air inlets **429** on the opposite side can alternate between being further from the center of the long sides and closer to the center of the long sides. In some implementations the two sets of bypass air inlets **429** can function independently (e.g., have little to no effect on the airflow outlet channel **426** with which they are in fluid communication).

[0397] As discussed above, the smaller individual airflow outlet channels **426** provide fluid volumes that can be more easily controlled while also exposing a larger overall volume of vapor to ambient air. The ability to introduce a large amount of turbulence into the airflow outlet channels **426** as described herein can be one implementation of such control. Nevertheless, the geometry and/or locations of the bypass air inlets **429** can be implemented in a manner that still increases the turbulence within a singular, larger airflow outlet channel **426**. As described herein, each of the rectangular (cuboid) bypass channels **438** defined in part by the bypass air inlets **429** can be replaced with more and/or differently sized rectangular (cuboid) bypass channels **438**, a plurality of circular (cylindrical) bypass channels **438**, and/or other geometries. The vaporizer device **400**, **400***i* can include at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***i* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**H and/or **4**J-**4**Q, except as noted or where impractical.

[0398] Other implementations exist where the vaporizable material **402** can have different geometries, such as illustrated in the vaporizer device **400***j* of FIG. **4**J. For example, in some implementations a space may be provided between the vaporizable material **402** and the mouthpiece portion **430**, such as within the proximal end of the heater portion **441**. Additionally or alternatively, the vaporizable material **402** can include a plurality of cartridge inlets **425**, such as at the cartridge distal end **420***a*. The vaporizer device **400**, **400***j* can include at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***j* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**I and/or **4**K-**4**Q, except as noted or where impractical.

[0399] Other implementations exist where additional structures can be present within and/or between the heater portion **441** and/or the mouthpiece portion **430**, such as those illustrated in the vaporizer device **400***k* of FIG. **4**K. As illustrated in FIG. **4**K, the cartridge **420** can further comprise a divider **454** comprising a plurality of bypass air inlets **429**. The divider **454** can be implemented as component that is in the shape of a ring or donut, which can include a cross-section that takes the form of the cross-section of the cartridge (e.g., elliptical or oval). In some implementations, the internal space formed by the divider **454** can be generally hollow. To prevent the vaporizable material **402** from entering the divider **454**, where it may block one or more of the bypass air inlet(s) **429**, the divider **454** can include one or more standoffs that at least partially close the bypass air inlet(s) **429** from the upstream end of the cartridge **420** (e.g., cartridge distal end **420***b*) while keeping the bypass air inlet(s) **429** open to the downstream end of the cartridge (e.g., cartridge proximal end **420***a*). In some implementations the divider **454** can include a solid or partially solid end (e.g., floor) at the upstream end of the divider **454**. For example, the divider **454** can include grates, a mesh material, and/or the like at the upstream end of the divider **454**. The benefits of such implementations can be similar to those of FIG. **4**E discussed herein, with the additional benefit that multiple different airflow outlet channels **426** do not need to be made within the same insert **424** or some combination of two or more different inserts **424**. Instead, the divider **454** can be implemented as a simpler component that is held (e.g., wrapped or inserted) within a layer of material (e.g., wrapper **422**), together with the heater portion **441** and the mouthpiece portion **430**, and through which the bypass air inlet(s) **429** are created (e.g., by laser-cutting, molding, pre-formed holes, and/or the like, as described herein).

[0400] The vaporizer device **400**, **400***k* can include at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***k* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**J and/or **4**L-**4**Q, except as noted or where impractical.

[0401] Other implementations exist where additional or alternative structures can be present within the mouthpiece portion **430** that lengthen the distance air must travel before reaching the airflow outlet(s) **428**, such as those illustrated in the vaporizer device **400***l* of FIG. **4**L. For example, as illustrated the mouthpiece portion **430** can include a plurality of baffles **455** that divert airflow within the airflow outlet channel **426**. In some implementations, the baffles **455** can extend across a majority of the cartridge **420** width, covering one end of the cartridge **420** width and leaving open a space at the opposite end of the cartridge **420** width. Each, subsequent baffle **455**, along the direction of the cartridge airflow path, can be disposed to leave open a space at a different end from the immediately preceding baffle **455**. For example, if a first baffle **455** is disposed to leave open a space at a first side of the cartridge **420** (e.g., a first short side), then a subsequent second baffle **455** is disposed to leave open a space at a second side of the cartridge **420** (e.g., a second short side, opposite the first short side along the cartridge **420** width), and this alternating pattern can continue for each subsequent baffle **455**. In various implementations, the cartridge **420** can include one baffles **455**, two baffles **455** (see FIG. **4**M), three baffles **455**, four baffles **455** (see FIG. **4**L), five baffles **455** (see FIG. **6**F), etc. The open spaces can form part of the airflow path along which the external air and vapor may travel, providing an airflow path with a longer, overall distance compared to an airflow path that travels straight through the mouthpiece portion along the cartridge **420** length. Further, the multiple changes in direction of the airflow path can introduce turbulence to help promote mixing, provide a longer and/or more tortuous airflow path to increase cooling time, and therefore promote proper aerosol formation.

[0402] In some implementations, the airflow outlet channel **426** can include a larger, open volume (e.g., condensation chamber) downstream of the baffles **455** and upstream of the airflow outlet(s) **428** (e.g., proximate the cartridge proximal end **420***a*), such as what is illustrated in the vaporizer device **400***m* of FIG. **4**M. Including the larger, open volume can promote the production of an aerosol that is more homogenous and/or can increase the residence time the vapor and air spend within the airflow outlet channel **426**, helping to cool the resulting aerosol to an even lower temperature and promoting proper aerosol formation. Further, the change in size between the smaller and larger portions of the airflow outlet channels **426** can introduce turbulence to help promote mixing, provide a longer and/or more tortuous airflow path to increase cooling time, and therefore promote proper aerosol formation.

[0403] The vaporizer devices **400**, **400***l*, **400***m* can include at least some the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer devices **400**, **400***l*, **400***m* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**K and/or **4**N-**4**Q, except as noted or where impractical.

[0404] Other implementations exist where the one or more heating element(s) **442** can have different geometries, such as illustrated in the vaporizer device **400***n* of FIG. **4**N. For example, the material forming the one or more heating elements **442** can be further extended to enclose and/or form at least a portion of the cartridge distal end **420***b*. Such a configuration can help retain the vaporizable material **402** within the cartridge **420**. In accordance with such implementations, the one or more heating elements **442** can include a plurality of cartridge inlets **425** such that external air (i.e., external to the cartridge **420**, such as the air within the receptacle **418**) can enter the heater chamber formed at least in part by the heating element(s) **442**. The plurality of cartridge inlets **425** can be through-holes formed in the direction of the cartridge **420** longitudinal dimension. Additionally or alternatively, the plurality of cartridge inlets **425** can be through-holes formed through the heating elements **442** in one or more directions that are perpendicular to the cartridge **420** longitudinal dimension, such as around a perimeter of the one or more heating elements **442** and/or proximate the cartridge distal end **420***b*, illustrated by the dashed boxes.

[0405] As illustrated the bottom of the heating element(s) **442**, that form and/or are proximate the cartridge distal end **420***b*, can include a plurality of cartridge inlets **425** configured to allow external air to enter the heater chamber within the heating element(s) **442**. As illustrated, the heating elements **442** can heat the vaporizable material from a direction that is approximately perpendicular to the cartridge **420** length and from a direction that is approximately parallel to the cartridge **420** length. The vaporizer device **400**, **400***n* can include at least some the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer device **400**, **400***n* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**M and/or **4**O-**4**Q, except as noted or where impractical.

[0406] Other implementations exist where the cartridge **420** can be heated externally by conductive and/or convective heat, such as illustrated in the vaporizer device **400***o* of FIG. **4**O. For example, rather than the heater portion **441** of the cartridge including the heating element(s) **442**, the heater portion **441** can instead include a container **423** configured to hold the vaporizable material **402**. The container **423** can take the form (e.g., material and/or geometry) of any of the heating elements described herein, but is instead configured to receive heat from one or more external heating elements **442** (e.g., external to the cartridge **420**, such as within the receptacle **418** or otherwise configured to heat the receptacle **418** itself) and redistribute the heat to the vaporizable material **402**, rather than generate heat independently (such as with inductive heating). As illustrated the bottom of the container **423**, that forms and/or is proximate the cartridge distal end **420***b*, can include a plurality of cartridge inlets **425** configured to allow external air to enter the heater chamber within the container **423**. As illustrated, the heating elements **442** can heat the container **423** from a direction that is approximately perpendicular to the cartridge **420** length. However, other implementations exist where the heating elements **442** also heat the container **423** from a direction that is approximately parallel to the cartridge **420** length, such as illustrated in the vaporizer device **400***p* of FIG. **4**Q.

[0407] The vaporizer devices **400**, **400***o*, **400***p* can include at least some of the same components of, and otherwise operate in the same or similar manner as, the vaporizer device **400***a* of FIGS. **4**A-**4**B, except as noted. Separately, the components of vaporizer devices **400**, **400***o*, **400***p* identified and discussed herein can be combined into any of the other vaporizer devices **400** described with respect to FIGS. **4**A-**4**N, except as noted or where impractical.

[0408] In order to control the thermal efficiency of the vaporizer devices described herein, it can be beneficial to provide an air gap between portions of the cartridge **420** and the receptacle **418** into which the cartridge is received, while still keeping the cartridge **420** secure within the receptacle **418**. For example, FIGS. **16**A and **16**B illustrates cross-sectional views of a cartridges **1620** and vaporizer bodies **1610** for use in a vaporizer device. As illustrated, each of the cartridges **1620** include a heating element **1642**, and the vaporizer bodies **1610** include airflow inlet(s) **1634**, airflow inlet path(s) **1632**, ridges **1646**, inductors **1643**, flux concentrators **1648**, and frames **1647**, which can be implemented similar to the corresponding components of vaporizer devices **400** of FIGS. **4**A-**4**Q. As can be seen by comparison of the temperatures gradients of the heating element **1642** in FIGS. **16**A and **16**B, having components of the vaporizer body **1610** closer to the heating element **1642** can decrease the thermal efficiency of the system. This is due in part to heat lost into components of the vaporizer body **1610**, such as the frame **1647**. Accordingly, in some implementations, an air gap can be provided between the heating element **1642** and other components of the vaporizer body **1610**, such as an interior perimeter of the receptacle **1618**. As shown in FIG. **16**B, ridges **1646** can be provided to secure portions of the cartridge **1620** other than the heating element **1642**, such as at a mouthpiece portion of the cartridge **1620** and/or an end cap in the heater portion of the cartridge **1620** (which does not contain the heating element **1642**). In some implementations, the air gap is defined in part by a distance between the exterior of the cartridge **1620**, proximate the heating element **1642**, and the interior walls of the receptacle **1618**. For example, this length can be between approximately one half and one third the depth of the cartridge **1620**.

[0409] FIGS. **5**A-**5**J illustrate different schematics and views of various implementations of a holder assembly **558**, **558***a-d* consistent with implementations of the current subject matter. These holders **558**, **558***a-d* can be implementations of one or more components of the vaporizer body **110** of FIGS. **1**A-**1**B, the vaporizer body **210** of FIG. **2**, and/or the vaporizer bodies **410** of FIGS. **4**A-**4**Q, such as the holder assembly **458**.

[0410] As illustrated in FIG. **5**A, the holder assembly **558**, **558***a* can include a frame **547** defining a receptacle **518** for insertion of a cartridge. The frame **547** can include two long sides and two short sides, similar to the cartridges described herein. For example, the long sides of the frame **547** can be configured to align with the long sides of the cartridge and the short sides of the frame **547** can be configured to align with the short sides of the cartridge when the cartridge is insertably received within the receptacle **518**. As disclosed above, a surface of the cartridge (e.g., cartridge **220**) extending primarily along the cartridge width can be referred to as a long side of the cartridge and/or as being on a long side of the cartridge, which can align with the long side of the frame **547**. Additionally, a surface of the cartridge (e.g., cartridge **220**) extending primarily along the cartridge depth can be referred to as a short side of the cartridge and/or as being on a short side of the cartridge **220**, which can align with the short side of the frame **547**. It will be appreciated that this terminology can be applied to any implementation of a cartridge (including its subcomponents described herein) and frame **547**, and this terminology is not redefined with respect to each implementation for the sake of brevity. As illustrated, the frame **547** can include an inductor **543** formed as a spiral coil on a long side of the frame **547**. Inductor **543** coils depicted and/or described as spiral coils herein can take the form of parallel or anti-parallel pancake or Helmholtz structures, although other structures are contemplated. The electrical leads **544***a* that power the inductor **543** can be disposed on a short side of the frame. The electrical leads **544***a* that power the inductor **543** can be electrically coupled with a controller and/or driving circuit for powering the inductor **543** as described herein. As described herein, the inductor **543** can be configured to generate an electromagnetic field for generating heat in a heating element of the cartridge, which can take the form of a susceptor.

[0411] As described herein, it can be desirable to measure an inductance, resistance, and/or impedance of the heating element for use in determining and/or controlling a temperature of the heating element, such as based on a thermal coefficient of resistivity of the heating element. Various circuit may be provided for measuring the inductance, resistance, and/or impedance of the heating element, such as the sensing coil **513**. In some implementations, the sensing coil **513** can be disposed in an open center region **562** of the inductor **543** and/or on a long side of the frame **547**, such as illustrated in FIG. **5**A. In such implementations, the sensing coil **513** can be in the form of a spiral coil. As illustrated, the electrical leads **544***b* the power the sensing coil **513** can be disposed at the distal end **561** of the frame **547**. In some implementations, the illustrated and described sensing coils **513** can be inductors **543** configured to generate an electromagnetic field for generating heat in a heating element (e.g., susceptor) of the cartridge. In accordance with these implementations, one or more (e.g., all) of the inductors **543** can be configured to measure the inductance, resistance, and/or impedance of the heating element as described herein.

[0412] In some implementations, the open center region **562** in the middle of the inductor **543** can be increased in size, which can lead to an increased efficiency in delivering energy to the heating element of the cartridge in the receptacle **518**. For example, in a circular region defined by a radius that extends from the center of the inductor **543** to the outer-most turn of the inductor **543**, the open center region **562** in which turns of the inductor **543** are not present can occupy 20-50% of the surface area of the circular region. In some implementations, the open center region **562** can take up 30-40% of the circular region. In some aspects, having a larger open center region **562** can result in increased efficiency in delivering energy from the inductor **543** into the heating element to be heated via the magnetic or electromagnetic field. In implementations where the illustrated and described sensing coils **513** are additionally or alternatively configured as inductors **543**, the collective set of inductors **543** can be configured to heat separate regions of the heating element. For example, a first region of the heating element adjacent the illustrated sensing coils **513** can be heated independently from a second region of the heating element adjacent the illustrated inductors **543**. In this manner, greater control over aerosol production over the life of a cartridge can be provided.

[0413] As illustrated in FIGS. **5**B-**5**D, the sensing coil **513** can be disposed within a region near a proximal end **560** of the frame **547**. The sensing coil **513** can be wrapped around the frame **547** a plurality of times, so that the sensing coil **513** is capable of measuring inductance, resistance, and/or impedance of the heating element. Within this region, the sensing coil **513** can still be disposed in sufficiently close proximity to the heating element of the cartridge, which can be configured to extend up to or proximate the opening of the receptacle **518** when the cartridge is inserted within the receptacle **518**. In accordance with these implementations, the inductor **543** may not include an open center region **562**. Other locations and/or configurations for the sensing coil **513** are contemplated, as described herein (see e.g., FIG. **5**I), including selectively powering one or more of the inductors **543** off to use the inductor **543** as a sensing coil, without the presence of a separate sensing coil **513**. Alternatively, the illustrated and described sensing coils **513** can be inductors **543** configured to generate an electromagnetic field for generating heat in a heating element (e.g., susceptor) of the cartridge. In accordance with these implementations, one or more (e.g., all) of the inductors **543** can be configured to measure the inductance, resistance, and/or impedance of the heating element as described herein.

[0414] As illustrated in FIG. **5**C, a long side of the frame **547** can include a plurality of inductors **543***a-d*, which can be in the form of spiral coils, and each have their own, independent sets of electrical leads **544***a-d* that can be coupled to a controller and/or driving circuit. As described herein, each of the plurality of inductors **543***a-d* can be powered off and on independently, such that different regions of a heating element can be selectively heated. For example, all of the inductors **543***a-d* can be powered at the same time and with the same amount of power, all or some of the inductors **543***a-d* can be powered at the same time and but with differing amounts of power, and/or only a portion of the inductors **543***a-d* can be powered at the same time and with the same or different amounts of power.

[0415] Although one set of four inductors **543***a-d* are illustrated and an additional set of inductors on the opposing long side are described, other numbers of inductors **534** are contemplated. For example, sets of two inductors **543** on each of the opposing long sides are contemplated, which can be spaced apart from each other along the longitudinal dimension or transverse to the longitudinal dimension. Separately, sets of three, five, six, or more inductors **543** are contemplated, and it is not required that the same number of inductors **543** be implemented on each of the long sides. Other implementations exist in which the inductor(s) **543** do not take the shape of a spiral coil, such as the inductor **543** of FIG. **5**D, wrapped around the short and long sides of the frame **547** multiple times. In some implementations, a plurality of inductors **543** can be disposed in series along the frame **547** (e.g., between the proximal end **560** and the distal end **561** of the frame **547**), such as two, three, or more inductors **543**. For example, the plurality of inductors **543** can be formed as solenoid coils, with a space along the frame **547** between each inductor **543**.

[0416] In some implementations, the long and short side of the frame **547** that are shown can be the same or similar to the long and/or short side of the frame **547** that are not shown. For example, the long side of the frame **547** that is not shown in FIGS. **5**A and **5**B can also include an inductor **543**, such that the receptacle **518** is between two opposing inductors **543**. Such a configuration can provide benefits, such as by heating a wider surface area of the heating element, into which it is easier to generate eddy currents using less energy. The long side of the frame **547** that is not shown in FIG. **5**C can similarly also include a plurality of inductors **543**, such that more control can be provided over how and where heat is generated.

[0417] In some implementations, the various configurations and positions of the illustrated and described inductors **543** and/or sensing coils **513** (additionally or alternatively configured as inductors) of FIGS. **5**A-**5**D can be at least partially combined. For example, in some implementations, the illustrated inductor **543** of FIG. **5**B can be substituted with the illustrated inductor **543** and sensing coil **513** of FIG. **5**A (on both opposing long sides of the frame **547**). Additionally or alternatively, the illustrated sensing coil **513** in FIG. **5**B can be implemented at each of the proximal end and the distal end of the frame **547** (and each be implemented as sensing coils and/or inductors). Accordingly, separate regions of the heating element adjacent the illustrated inductors **543** and/or sensing coils **513** can be heated independently to provide greater control over aerosol production, as described herein. It will be appreciated that the ability to heat the heating element in as many independent regions is desirable, but that the implementation of more inductors **543** and/or sensing coils **513** is more expensive and more complicated (e.g., in order to properly account for mutual inductance).

[0418] In various implementations, the shape and/or structure of the inductors **543** can be varied to increase and/or tune their efficiency, such as based on their coupling efficiency with a heating element of a cartridge in the receptacle **518**. For example, one or more of the inductors **543** can include varying numbers of cross-sections, shapes, strand counts, strand gauges, and/or the like of coils. The coils could also be bent to have the same general curvature as the heating element to improve performance, or could be straightened (e.g., along the cartridge width) to limit the coupling efficiency to a specific degree. In some implementations, a flex based coil can be used to decrease manufacturing costs of the device and the consumables, such as by only requiring a relatively thin aluminum layer.

[0419] In some implementations, a cartridge for use with a holder assembly **558** that includes multiple inductors **543** can include regions with different susceptibilities. For example, a cartridge can be manufactured to include different materials and/or thicknesses in certain regions depending on each region's intended proximity to an inductor **543**. In some implementations, a cartridge can be manufactured to include a first material and/or material of a first thickness in a first region (or set of first regions) that is disposed at or near a first inductor **543** (or set of first inductors **543**), and a second material and/or material of a second thickness in a second region (or set of second regions) that is disposed away from the first inductor **543** (or set of first inductors **543**). In some aspects, if multiple inductors **543** are used, the regions of the cartridge that are between the set of first regions can include the second region(s).

[0420] As illustrated in FIG. **5**E, the heating element **542** that forms part of the cartridge containing vaporizable material can be sized and configured to fit within the receptacle **518** of the holder assembly **558*e***. As described herein, the heating element **542** can be configured as a susceptor to be electromagnetically coupled with one or more inductor coils. Within the receptacle **518**, there can be a plurality of ridges **546** configured to retain the cartridge, and thereby the heating element **542** within the receptacle **518**. The holder assembly **558*e*** can include a ledge **590** that at least partially defines an opening into the receptacle **518**. The ledge **590** can include features, such as a chamfered edge, that facilitate placement of the cartridge into the receptacle **518**. When the holder assembly **558*e*** is within a fully assembled vaporizer body **110**, **210**, **410**, **1610**, the ledge **590** of the holder assembly **558*e*** can form at least a portion of a proximal end of the vaporizer body **110**, **210**, **410**, **1610** (e.g., ledge **121**, **221**) or the ledge **590** of the holder assembly **558*e*** can be recessed from the proximal end of the vaporizer body **110**, **210**, **410**, **1610**.

[0421] As illustrated, in FIGS. **5**E-**5**G, taken along cross-section B-B of FIG. **5**F, the holder assembly **558** can include a pair of inductors **543*a***, **543*b*** on the long sides of the frame **547**, each with a corresponding flux concentrator **548*a***, **548*b*** disposed against the exterior face of the inductors **543**. That is, each of the pair of inductors **543*a***, **543*b*** can be disposed (e.g., sandwiched) between a corresponding flux concentrator **548*a***, **548*b*** and long sides of the frame **547**. As described herein, each of the flux concentrators **548** can be configured to direct the electromagnetic fields generated by each of the inductors **543**, towards the one or more heating elements **542** when it is disposed within the receptacle, to generate heat in a more concentrated manner. That is, the electromagnetic fields generated by each of the inductors **543** that would otherwise be directed outside of the direction of the receptacle **518** can instead be directed towards the receptacle **518**, further optimizing the heating process and/or requiring less energy to operate.

[0422] For example, as illustrated in FIG. **5**H, the plurality of ridges **546** can be disposed around an inner perimeter of the receptacle **518**. As illustrated in FIGS. **51** and **5**J, taken along cross-section C-C of FIG. **5**H, the ridges **546** can take different forms. For example, as illustrated in FIG. **5**I, one or more of the ridges **546** can take the form of a bar that extends along a longitudinal dimension of the receptacle **518**, such as between a proximal end and a distal end of the receptacle **518**. In some implementations, a sensing circuit **513** can be included on a surface of at least one of the ridges **546**. Such a sensing circuit **513** can be configured to physically contact the heating element **542** to measure the resistance of the heating element **542** at any point in time. As illustrated in FIG. **5**J, one or more of the ridges **546** can be separated into two portions, such as a portion that is proximate the distal end and another portion that is proximate the proximal end of the receptacle. To minimize potentially damaging the cartridge and/or heating element **542**, the ridges **546** can include angled surfaces that better guide the cartridge into the receptacle **518**. In some implementations, the different forms of the ridges **546** discussed with respect to FIGS. **5**I-**5**J can each be implemented within the same receptacle.

[0423] Other configurations of the inductors **543** and holder assembly **558** are contemplated, such as the inductors and/or holder assemblies illustrated in FIGS. **11**A-**11**I, **12**A-**12**E, and **13**A-**13**G. For example, FIGS. **11**A-**11**C illustrate perspective views of a cartridge **1120** and various configurations of inductors **1143***a*, **1143***b* (collectively referred to as inductor(s) **1143**) for use in a vaporizer device, consistent with implementations of the current subject matter. As illustrated in FIG. **11**A, a center of each inductor **1143***a*, **1143***b* can be configured to be disposed at or near separate, respective short sides of the cartridge **1120** when the cartridge **1120** is inserted and/or each inductor **1143***a*, **1143***b* can take the shape of a c-shaped or oblong coil. A c-shaped coil can refer to an inductor **1143***a*, **1143***b* with two opposing ends that are in the shape of the letter "C", and approximately parallel edges between the opposing ends. An oblong coil can refer to an inductor **1143***a*, **1143***b* having a generally rectangular shape with two opposing ends that are rounded. The opposing ends of each inductor **1143***a*, **1143***b* can be defined by a location of the outer-most turn of a wire defining the inductor **1143***a*, **1143***b*. The center of each inductor **1143***a*, **1143***b* can be regarded as a point or line that is central to the length, width, and/or depth of the inductor **1143***a*, **1143***b*, such as from the perspective of the inductor **1143***a*, **1143***b* when it is flattened. The center of each inductor **1143***a*, **1143***b* can be configured to be disposed proximate a center of the heating element **1142** of the cartridge **1120** on each short side of the heating element **1142** (e.g., central point or cross-section along the length of the heating element **1142**), when the cartridge **1120** is inserted. The inductors **1143***a*, **1143***b* can form part of a holder assembly **1158***a* which defines a receptacle (not shown) configured to receive the cartridge **1120**, with the heating element **1142** disposed substantially within the receptacle when the cartridge **1120** is inserted.

[0424] As illustrated in FIG. **11**B, a center of each inductor **1143***a*, **1143***b* can instead be configured to be disposed at or near separate, respective long sides of the cartridge **1120** when the cartridge **1120** is inserted and/or each inductor **1143***a*, **1143***b* can take the shape of a flattened circular, oval, c-shaped or oblong coil. The center of each inductor **1143***a*, **1143***b* can be configured to be disposed proximate a center of the heating element **1142** of the cartridge **1120** on each long side of the heating element **1142** (e.g., central point or cross-section along the length of the heating element **1142**), when the cartridge **1120** is inserted. The inductors **1143***a*, **1143***b* can form part of a holder assembly **1158***b* which defines a receptacle (not shown) configured to receive the cartridge **1120**, with the heating element **1142** disposed substantially within the receptacle when the cartridge **1120** is inserted.

[0425] As illustrated in FIG. **11**C, a center of each inductor **1143***a*, **1143***b* can instead be configured to be disposed at or near the same short side of the cartridge **1120** when the cartridge **1120** is inserted and/or each inductor **1143***a*, **1143***b* can take the shape of a c-shaped or oblong coil. The center of each inductor **1143***a*, **1143***b* can be configured to be disposed away from a center of the heating element **1142** of the cartridge **1120** on the short side of the heating element **1142** (e.g., central point or cross-section along the length of the heating element **1142**), when the cartridge **1120** is inserted. For example, the heating element **1142** can be regarded as having two sections, divided by a cross-section along the length of the heating element **1142** (e.g., with the cross-section central to the length of the heating element **1142**), with a top section that is closer to the mouthpiece of the cartridge **1120** and/or higher along the length when the cartridge **1120** is placed on a flat surface with the heating element **1142** proximate the flat surface, and a bottom section that is further from the mouthpiece of the cartridge **1120** and/or lower along the length when the cartridge **1120** is placed on a flat surface with the heating element **1142** proximate the flat surface. Accordingly, the center of the first inductor **1143***a* can be configured to be disposed proximate a center of the top section of the heating element **1142** on the short side of the heating element **1142** (e.g., central point or cross-section along the length of the top section of the heating element **1142**) and the center of the second inductor **1143***b* can be configured to be disposed proximate a center of the bottom section of the heating element **1142** on the short side of the heating element **1142** (e.g., central point or cross-section along the length of the bottom section of the heating element **1142**), when the cartridge **1120** is inserted. The inductors **1143***a*, **1143***b* can form part of a holder assembly **1158***c* which defines a receptacle (not shown) configured to receive the cartridge **1120**, with the heating element **1142** disposed substantially within the receptacle when the cartridge **1120** is inserted. In alternative implementations, the inductors **1143***a*, **1143***b* can instead be configured to be disposed proximate centers of the top section and the bottom section of the heating element **1142** on the long side of the heating element **1142** (e.g., central point or cross-section along the respective heights of each of the top section and the bottom section of the heating element **1142**), when the cartridge **1120** is inserted.

[0426] As described herein with respect to at least FIGS. **12**A-**12**E and **13**A-**13**G, more or less inductors **1143***a*, **1143***b* can be present and/or be positioned in different locations relative to the locations illustrated in FIGS. **11**A-**11**C. Although not illustrated, one or more flux concentrators can be configured to direct the electromagnetic field of each of the inductors **1143***a*, **1143***b* in a direction of the heating element **1142**, similar to flux concentrators **448**, **548** described herein.

[0427] FIGS. **11**D-**11**I illustrate perspective views of additional various configurations of inductors **1143** for use in a vaporizer device, consistent with implementations of the current subject matter. As illustrated in FIG. **11**D, a center of each of two inductors **1143***a*, **1143***b* can be configured to be disposed at or near separate, respective short sides of the heating element **1142** of a cartridge when the heating element **1142** is inserted into a receptacle of a holder assembly **1158***d*. The center of each inductor **1143***a*, **1143***b* can be regarded as a point or line that is central to the length, width, and/or depth of the inductor **1143***a*, **1143***b*, such as from the perspective of the inductor **1143***a*, **1143***b* when it is flattened. Each inductor **1143***a*, **1143***b* can optionally take the shape of a c-shaped or oblong coil. The center of each inductor **1143***a*, **1143***b* can be configured to be disposed proximate a center of the heating element **1142** on each short side of the heating element **1142** (e.g., central point or cross-section along the length of the heating element **1142**), when the heating element **1142** is inserted into the holder assembly **1158***d*.

[0428] As illustrated, each of the inductors **1143***a*, **1143***b* can include an open center region **1162** in a center of the respective inductor **1143***a*, **1143***b*. In some implementations, the open center regions **1162** in the centers of the inductors **1143***a*, **1143***b* can provide an increased efficiency in delivering energy to the heating element **1142**. For example, the open center regions **1162** can occupy a region that is 15-50% or 20-40% of the total surface area of the inductors **1143***a*, **1143***b*, with the total surface area of the inductors **1143***a*, **1143***b* being defined by the area bounded by the outer-most turns of the wire defining the inductor **1143***a*, **1143***b* and inclusive of the area of the open center regions **1162**. In some aspects, having a larger open center region **1162** can result in increased efficiency in delivering energy from the inductors **1143***a*, **1143***b* into the heating element **1142**. The size and shape of the open center region **1162** can be dependent on the size and shape of the respective inductor **1143***a*, **1143***b*. For example, the open center region **1162** can be c-shaped or oblong based on the inductors **1143***a*, **1143***b* being c-shaped or oblong.

[0429] As illustrated, one or more flux concentrators **1148** can be disposed proximate and exterior to the inductors **1143***a*, **1143***b* (e.g., between the inductors **1143***a*, **1143***b* and an external shell of the vaporizer body that includes the inductors **1143***a*, **1143***b* and one or more flux concentrators **1148**). The one or more flux concentrators can be configured to direct the electromagnetic field of each of the inductors **1143***a*, **1143***b* in a direction of the heating element **1142**, similar to flux concentrators **448**, **548** described herein. As illustrated, a separate flux concentrator **1148** can be disposed proximate each respective inductor **1143***a*, **1143***b* and separated by a gap between the flux concentrators **1148** that is proximate the long side of the holder assembly **1158***d*. However, in some implementations a single flux concentrator **1148** can be disposed substantially around a perimeter of the holder assembly **1158***d*. The holder assembly **1158***d* can include or be in close proximity to the inductors **1143***a*, **1143***b* and the flux concentrator(s) **1148**. The holder assembly **1158***d* can define a receptacle (not shown) configured to receive the heating element **1142**.

[0430] As illustrated, the first inductor **1143***a* can be electrically coupled to first electrical leads **1144***a* that are configured to power the first inductor **1143***a* and the second inductor **1143***b* can be electrically coupled to second electrical leads **1144***b* that are configured to power the second inductor **1143***b*. The electrical leads **1144***a*, **1144***b* can be electrically coupled with a controller and/or driving circuit for powering the respective inductors **1143***a*, **1143***b* as described herein.

[0431] As illustrated, in FIG. **11**E, the first inductor **1143***a* described with respect to FIG. **11**D can be replaced with first inductor **1143***a* and third inductor **1143***c*, and the second inductor **1143***b* described with respect to FIG. **11**D can be replaced with second inductor **1143***b* and fourth inductor **1143***d*. The inductors **1143***a*-**1143***d* (collectively referred to as inductor(s) **1143**) can be disposed on, within, or proximate holder assembly **1158***e*. Each of the inductors **1143***a*-**1143***d* can respectively be electrically coupled to their own electrical leads **1144***a*-**1144***d*. If two flux concentrators **1148** are included, then a first flux concentrator **1148** can be disposed proximate and exterior to the first and third inductors **1143***a*, **1143***c*, and a second flux concentrator **1148** can be disposed proximate and exterior to the second and fourth inductors **1143***b*, **1143***d*. Implementations of FIG. **11**E can otherwise be the same or similar to the implementations described with respect to FIG. **11**D.

[0432] As illustrated, in FIG. **11**F, the center of each of the two inductors **1143***a*, **1143***b* described with respect to FIG. **11**D can instead be configured to be disposed at or near separate, respective long sides of the heating element **1142** of a cartridge (not illustrated) when the heating element **1142** is inserted into a receptacle of a holder assembly **1158***f*. Implementations of FIG. **11**F can otherwise be the same or similar to the implementations described with respect to FIG. **11**D.

[0433] As illustrated, in FIG. **11**G, the first inductor **1143***a* described with respect to FIG. **11**F can be replaced with first inductor **1143***a* and third inductor **1143***c*, and the second inductor **1143***b* described with respect to FIG. **11**F can be replaced with second inductor **1143***b* and fourth inductor **1143***d*. The inductors **1143***a*-**1143***d* can be disposed on, within, or proximate holder assembly **1158***g*. Each of the inductors **1143***a*-**1143***d* can be respectively electrically coupled to their own electrical leads **1144***a*-**1144***d*. If two flux concentrators **1148** are included, then a first flux concentrator **1148** can be disposed proximate and exterior to the first and third inductors **1143***a*, **1143***c*, and a second flux concentrator **1148** can be disposed proximate and exterior to the second and fourth inductors **1143***b*, **1143***d*. Implementations of FIG. **11**G can otherwise be the same or similar to the implementations described with respect to FIG. **11**F (and thereby, FIG. **11**D).

[0434] As illustrated, in FIG. **11**H, the heating element **1142** and its respective cartridge can be formed to have a cylindrical shape (along the cartridge length). As such, the heating element **1142** may not be considered as having long sides and short sides. Accordingly, three inductors **1143***a*, **1143***b*, **1143***c* can be configured to be disposed at or near a perimeter of the heating element **1142** of the cartridge when the heating element **1142** is inserted into a receptacle of a holder assembly **1158***h*. In some implementations, each of the three inductors **1143***a*, **1143***b*, **1143***c* are equally spaced apart from each other, around a perimeter of the holder assembly **1158***h*. Each of the inductors **1143***a*-**1143***c* can be respectively electrically coupled to their own electrical leads **1144***a*-**1144***c*. Three flux concentrators **1148** can be included, with each flux concentrator **1148** disposed proximate and exterior to a respective inductor **1143***a*, **1143***b*, **1143***c*. In some implementations, other numbers of inductors **1143** can be present, such as two inductors **1143**, three inductors **1143**, four inductors **1143**, six inductors **1143**, or the single inductor **1143** illustrated in FIG. **11**I. Implementations of FIGS. **11**H and **11**I can otherwise be the same or similar to the implementations described with respect to FIG. **11**D.

[0435] In operation, each of the inductors **1143***a*-**1143***d* can be configured to generate an electromagnetic field to heat the heating element **1142**, derive characteristics about the heating element **1142**, and/or operate similar to the inductors **443**, **543**, **943** described herein. It will be appreciated that the cartridge **1120** is intended to be inserted by a user and can be manufactured to have different geometries within a tolerable range of geometries. Accordingly, with each use of a cartridge **1120**, the heating elements **1142** thereof can be placed in slightly different locations relative to the inductors **1143***a*, **1143***b*. As such, the use of terms like "center" can be regarded as covering use-case scenarios within a tolerable range, such as within 1%, within 2%, within 3%, within 5%, or within 10% of the defined "center."

[0436] In order to form each of the inductors **1143** illustrated and described in FIGS. **11**D-**11**I, a wire (e.g., multi-strand, copper, and/or Litz wire) can be wound into a desired geometry, such as a geometry that includes a circular or non-circular cross-section. FIGS. **8**A-**8**F illustrate example cross-sections that can be used for the geometry of the inductors **1143***a*, **1143***b*, etc., including but not limited to) rectangular cross-sections, rounded rectangular cross-sections, elliptical or oval cross-sections, oblong cross-sections, c-shaped cross-sections, or other cross-sections that include corners, bends, edges, protrusions, recesses, and/or the like. In various implementations, the inductors **1143** can include two or more layers of wire, with the layers disposed on top of one another from the perspective of the vaporizer device width or depth. For example, the inductors **1143** can include a first layer of turns that is closer to and/or on a holder assembly **1158** of the vaporizer device, and a second layer of turns that is further from the holder assembly **1158** and/or closer to the external shell of the vaporizer body that includes the holder assembly **1158**. If the holder assembly **1158** or the vaporizer device are defined in part by a circular cross-section, the layers of wire can be regarded as being disposed on top of one another from the perspective a radius of the holder assembly **1158** and/or vaporizer device.

[0437] Although the inductors **1143** and other components of FIGS. **11**A-**11**I are illustrated and described as being in certain locations, alternate locations are contemplated. For example, FIGS. **12**A-**12**E illustrate example relative positions of inductors **1243***a*, **1243***b*, including on top of each other along the length of the cartridge **1220** and on the same side of the heating element **1242**, but disposed or wrapped around less than half of the perimeter of the heating element **1242** (FIG. **12**A), higher and lower than each other along the length of the cartridge **1220** but on opposing sides of the heating element **1242** and without overlap in any cross section taken along the length of the heating element **1242** (FIG. **12**B), higher and lower than each other along the length of the cartridge **1220** but on opposing sides of the heating element **1242** and with a partial overlap in a cross section taken along the length of heating element **1242** (FIG. **12**C), on top of each other along the length of the cartridge **1220** and on opposite sides of the heating element **1242** for a total of four inductors **1143** with each respectively disposed or wrapped around less than half of the perimeter of the heating element **1242** (FIG. **12**D), on top of each other along the length of the cartridge **1220** and on the same side of the heating element **1242** but disposed or wrapped around a majority of the perimeter of the heating element **1242** (FIG. **12**E), and/or the like. In some implementations, the inductors **1243** can instead take the form of solenoid coils that are formed from a wire wrapped a plurality of times around the perimeter of the heating element **1242**. Although the cartridges **1220** and heating elements **1242** of FIG. **12**A-**12**E are illustrated as being cylindrical, the relative positions of the inductors **1243***a*, **1243***b* can be applied to implementations with cartridges **1220** and heating elements **1242** having different cross-sections. For example, any of the inductors **1143** of FIGS. **11**A-**11**G can be modified such that they are positioned relative to each other as illustrated and described with respect to FIGS. **12**A-**12**E.

[0438] Additionally or alternatively, relative positions of the inductors **1143** and other components of FIGS. **11**A-**11**I around a perimeter of the heating element **1142** and/or holder assemblies **1158***a*-**1158***i* are contemplated. For example, FIGS. **13**A-**13**G illustrate example relative positions of inductors **1343** around a perimeter of heating element **1342**, including one inductor **1343** or set of inductors **1343** disposed on one side of the perimeter of a circular heating element **1342** (FIG. **12**A), two inductors **1343** or two sets of inductors **1343** disposed at opposing sides of the perimeter of a circular heating element **1342** (FIG. **12**B), three inductors **1343** or three sets of inductors **1343** disposed approximately equally around a perimeter of a circular heating element **1342** (FIG. **12**C), four inductors **1343** or four sets of inductors **1343** disposed approximately equally around a perimeter of a circular heating element **1342** (FIG. **12**D), two inductors **1343** or two sets of inductors **1343** disposed at opposing sides (long sides or short sides) of the perimeter of a non-circular heating element **1342** (FIG. **12**E), three inductors **1343** or three sets of inductors **1343** disposed around a perimeter of a non-circular heating element **1342** (FIG. **12**F), four inductors **1343** or four sets of inductors **1343** disposed around a perimeter of a non-circular heating element **1342** (FIG. **12**G), and/or the like. Although each inductor **1343** is illustrated as having a flat rectangular cross-section, the inductors **1343** can instead be curved and/or wrapped around a portion of the perimeter of the heating element **1342** that is at or near each inductor **1343**. Any of the inductors **1143** of FIGS. **11**A-**11**I can be modified such that they are positioned relative to each other as illustrated and described with respect to FIGS. **13**A-**13**G. FIGS. **6**A-**6**J illustrate cross-sectional schematics of various implementations of a vaporizer cartridge **620***a-j* consistent with implementations of the current subject matter. Further, these vaporizer cartridges **620***a-j* can be implementations of one or more components of the vaporizer cartridges **120** of FIGS. **1**A-**1**B, the vaporizer cartridge **220** of FIG. **2**, the cartridge **320** of FIG. **3**, and/or the cartridges **400**, **400***a-q* of FIGS. **4**A-**4**Q.

[0439] As illustrated in FIG. **6**A, the cartridge **620**, **620***a* can include a mouthpiece portion **630** and a heater portion **641** within one or more layers of material (illustrated as wrapper(s) **622**). The cartridge **620** can extend between a cartridge proximal end **620***x* and a cartridge distal end **620***y*. The heater portion **641** can extend from a heater portion distal end **641***b* to a heater portion proximal end **641***a* and the mouthpiece portion **630** can extend from a mouthpiece portion distal end **630***b* to a mouthpiece portion proximal end **630***a*.

[0440] The heater portion **641** can include one or more heating element **642**, which at least partially defines a volume within which the vaporizable material **602** is held. The heating element(s) **642** can be configured to heat the vaporizable material **602** to generate a vapor. As described herein, the heat can be generated through inductive means, although conductive and/or convective heating can also be provided. The volume within which the vaporizable material

602 is held can be regarded as a heater chamber. Accordingly, the heating element(s) **642** can define at least a portion of a perimeter of a heater chamber containing the vaporizable material **602**, and in some implementations define substantially all of the perimeter.

[0441] As illustrated in FIG. **6**B, the heater portion **641** can include or be proximate to an end cap **664** at the cartridge distal end **620***y* to hold the vaporizable material **602** within the defined internal volume of the heater portion **641** and/or define a lower boundary of the volume (e.g., heater chamber). The end cap **664** can include one or more cartridge inlets (e.g., though-holes) such that ambient air may enter the heater chamber. Additionally or alternatively, the end cap **664** can include an air-permeable material such, such as a filter, configured to allow air to enter the heater chamber through the material. The end cap **664** (e.g., filter) can include material such as one or more of paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic (e.g., PET), cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like. In some aspects, the end cap **664** can be considered separate from the heater portion **641**, and the end cap **664** and heater portion **641** are be considered to be separate components of the cartridge **620**, held together within a layer of material (e.g., wrapped in the wrapper(s) during manufacture). However, as illustrated in FIG. **6**A, in some implementations an end cap **664** is not included. For example, in such implementations the vaporizable material **602** can be formed with sufficient rigidity (e.g., in the form of a puck or another pre-formed shape) that an end cap **664** is not required. In accordance with such implementations, the vaporizable material **602** itself can include one or more cartridge inlets (e.g., though-holes), although the inlets are not required if the vaporizable material **602** is manufactured with sufficient porosity. In the event the vaporizable material **602** is exposed (e.g., no end cap **664** is used), the boundary formed by the heating element(s) **642** and/or the layers of material (e.g., wrapper(s) **622**) at the cartridge distal end **620***y* can form a cartridge inlet, such that ambient air can enter the heater chamber. In some implementations, the end cap **664** can be positioned at an end of the cartridge **620**. In some implementations, the end cap **664** can be positioned offset (e.g., along the length of the cartridge **620**) from an end of the cartridge **620**, including not being a most distal or proximal element along an implementation of the cartridge **620**. For example, the end cap **664** can form a part of an outer surface of the cartridge **620** and/or the end cap **664** can be fully contained within the outer surface of the cartridge **620**. In some implementations, the cartridge **620** can include one or more end caps **664** that can be positioned in a variety of positions and configurations along the cartridge **620**.

[0442] In some implementations, the material forming the one or more heating elements **642** can be further extended to enclose the cartridge distal end **620***y* and help retain the vaporizable material **602**. The one or more heating elements **642** can include a plurality of cartridge inlets such that external air may enter the heater chamber, with the plurality of cartridge inlets being through-holes formed in the direction of the cartridge **620** longitudinal dimension and/or perpendicular to the direction of the cartridge **620** longitudinal dimension (e.g., around a perimeter of the one or more heating elements **642** and/or proximate the cartridge distal end **620***y*).

[0443] The mouthpiece portion **630** can include one or more insert **624**. The insert(s) **624** can include airflow outlet channels **626** that extend from corresponding vapor inlets **635** proximate the mouthpiece portion distal end **630***b* (which can be proximate the heater portion proximal end **641***a*), to corresponding airflow outlets **628** at the cartridge proximal end **620***x*. The airflow outlet channels **626** form a fluid connection between the heater portion **641** and the airflow outlets **628**, through the vapor inlets **635**, such that vapor generated in the heater portion **641** can be drawn towards the cartridge proximal end **620***x*, and ultimately out of the airflow outlets **628** as an inhalable aerosol that can be inhaled by a user. Proximate to the mouthpiece portion distal end **630***b*, the insert(s) **624** can further include bypass outlets **627**, that form a fluid connection between the respective airflow outlet channels **626** and ambient air, such as through corresponding bypass channels that are formed through the insert(s) (not illustrated) and bypass air inlets formed through the wrapper(s) (not illustrated). The airflow outlet channels **626** can each include one or more condensation chamber configured to condense the vapor from the heater chamber with the ambient air received through the bypass channels to form at least a portion of the inhalable aerosol. The bypass outlets **627** (as well as the corresponding airflow outlet channels and the bypass air inlets) and/or the bypass channels **638** can be formed via a laser-cutting operation through walls of the insert **624** during manufacturing.

[0444] In some implementations, the illustrated cross-section of the cartridge **620** can be a symmetrical half of the cartridge **620**, such as the cartridge **620***i* illustrated in FIG. **6**I. Accordingly, the cartridge **620** can include at least four bypass outlets **627** and corresponding bypass channels and bypass air inlets. In some implementations, more bypass outlets **627** and corresponding bypass channels and bypass air inlets are present, such as two on each side of each airflow outlet channels **626** (e.g., eight total), three on each side of each airflow outlet channels **626** (e.g., twelve total), four on each side of each airflow outlet channels **626** (e.g., sixteen total), etc. In related implementations, there may only be one airflow outlet channel **626**, which can similarly include one bypass outlet **627** and corresponding bypass channel and bypass air inlet on each side of each airflow outlet channel **626** (e.g., two total), two on each side of each airflow outlet channels **626** (e.g., four total), three on each side of each airflow outlet channels **626** (e.g., six total), four on each side of each airflow outlet channels **626** (e.g., eight total), etc.

[0445] Additionally or alternatively, the bypass outlets **627** and corresponding bypass channels and bypass air inlets can be formed of a different geometry. For example, each bypass outlet **627** and corresponding bypass channel and bypass air inlet can each collectively form a rectangular (cuboid) bypass channel that is in fluid communication with (e.g., between) the a respective airflow outlet channel **626** and ambient air, a circular (cylindrical) bypass channel, and/or the like. Where circular (cylindrical) bypass channels are included, each of the rectangular (cuboid) bypass channels can be replaced with a plurality of circular (cylindrical) bypass channels that are separated from each other and formed in a line along the cartridge **620** width, such as along the same lines illustrated for the rectangular bypass outlets **627**.

[0446] As illustrated in FIG. **6**C, the mouthpiece portion **630** can include or be proximate an end cap **674**, which forms at least a portion of the cartridge proximal end **620**_x_. The end cap **674** can close the airflow outlets **628** such that the airflow outlet channels **626** are not openly exposed and/or such that the end cap **674** forms an upper boundary of the airflow outlet channels **626** (e.g., one or more condensation chambers).

[0447] The end cap **674** can include one or more airflow outlets such that the inhalable aerosol may exit the one or more condensation chambers, and thereby exit cartridge **620**. Additionally or alternatively, the end cap **674** can include an air-permeable material such, such as a filter, configured to allow air to exit the one or more condensation chambers through the material. The end cap **674** (e.g., filter) can include material such as one or more of paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic, cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like. In some aspects, the end cap **674** can be considered separate from the mouthpiece portion **630**, and the end cap **674** and mouthpiece portion **630** are be considered separate components of the cartridge **620**, held (e.g., wrapped or inserted) within a layer of material (e.g., wrapper(s)) during manufacture. However, as illustrated in FIG. **6**A, in some implementations an end cap **674** is not included. In some implementations, the cartridge **620** can include both the end cap **674** proximate and/or as part of the mouthpiece portion **630**, and the end cap **664** proximate and/or as part of the heater portion **664**, as illustrated in FIG. **6**D.

[0448] As illustrated in FIG. **6**A, a space can exist at or between the intersection of the mouthpiece portion **630** and the heater portion **641**. In some aspects, this space can be intentional, or can be a natural byproduct of the composition of the vaporizable material **602** (e.g., relatively lose and not packed at manufacture). For example, this space can be surrounded by the heating element(s) **642**, a layer of material (e.g., wrapper **622** (e.g., where a relatively rigid layer of material is used)), a divider (such as the dividers **454** of FIG. **4**G, **4**K, **4**L, or **4**M) other walls (such as the walls **433** of FIG. **4**G), and/or the like. In an example implementation, the bypass outlets **627** and corresponding bypass channels and bypass air inlets may not be present in the filter, and can instead be present in this space, such as through a ring or donut-shaped divider.

[0449] Other implementations exist where differently shaped airflow outlet channels **626** are included, such as through one or more filters **624** in the mouthpiece portion **630** as illustrated in the vaporizer cartridge **620**_e_ of FIG. **6**E. As illustrated first and second airflow outlet channels **626**_a_, **626**_b_ can be formed within a first filter **624**_a_ disposed in a lower region of the mouthpiece portion **630** (e.g., closer to the mouthpiece portion distal end **630**_b_) and a third airflow outlet channel **626**_c_ can be formed within a second filter **624**_b_ disposed in an upper region of the mouthpiece portion **430** (e.g., closer to the mouthpiece portion proximal end **630**_a_). Each of the filters **624**, and thereby the airflow outlet channels **626** formed therein, can be positioned at different locations along the cartridge **620** length, and the locations of the filters **624**_a_, **624**_b_ can be swapped. As illustrated, each of the first and second airflow outlet channels **626**_a_, **626**_b_ include bypass outlets **627**, and thereby corresponding bypass channels and bypass air inlets as described herein. In implementations where the locations of the filters **624**_a_, **624**_b_ are be swapped, then a plurality of airflow outlet channels **626** can be included in the second filter **646**_b_ instead.

[0450] Each of the airflow outlet channels **626** can be of different dimensions, the same dimensions, or some mixture thereof. For example, the first and second airflow outlet channels **626**_a_, **626**_b_ can be of the same dimensions, whereas the third airflow outlet channel **626**_c_ can be of different dimensions. As illustrated, the first and second airflow outlet channels **626**_a_, **626**_b_ can be smaller along the cartridge **620** width compared to the third airflow outlet channel **626**_c_.

[0451] Advantages with this configuration exist compared to using only one or two airflow outlet channels **626**. For example, when the air and vapor from the heater portion **641** (e.g., heater chamber) enters the independent first and second airflow outlet channels **626**_a_, **626**_b_ and mix with ambient air from the bypass channels, the smaller fluid volumes provide a better restriction to draw and spaces in which a larger overall portion of the vapor is able to independently mix with ambient air, helping to cool and condense the vapor faster. Thereafter, when the air and vapor enter the larger third airflow outlet channel **626**_c_, aerosol generation can benefit from the increased residence time within the third airflow outlet channel **626**_c_, helping the air and vapor to cool for longer, and provide for better mixing that results in a more homogenous aerosol.

[0452] The first and second filter **624** can be wrapped together with the end cap **674**, when present, within a layer of material (e.g., wrapper **622**) so that they may be held together to form the mouthpiece portion **630**, and an additional layer of material (e.g., wrapper **622**) can be included that holds the mouthpiece portion **630** together with the heater portion **641** to form the cartridge **620**. In other implementations, the first and second filter **624** can be wrapped together within a layer of material (e.g., wrapper **622**) so that they may be held together to form the mouthpiece portion **630**, and an additional layer of material (e.g., wrapper **622**) can be included that holds the mouthpiece portion **630** and the end cap **674** together with the heater portion **641** to form the cartridge **620**. The vaporizer cartridge **620**, **620**_e_ can include the same components of, and otherwise operate in the same manner as, the vaporizer cartridge **620**_a_ of FIG. **6**A, except as noted. Separately, the components of vaporizer cartridge **620**, **620**_e_ identified and discussed herein can be combined into any of the other vaporizer cartridges **620** described with respect to FIGS. **6**A-**6**D and/or **6**F-**6**J, except as noted or where impractical.

[0453] Other implementations exist where additional structures can be present within the mouthpiece portion **630** that lengthen the distance air must travel before reaching the airflow outlet(s) **628**, such as those illustrated in the vaporizer cartridge **620**_f_ of FIG. **6**F. For example, as illustrated the mouthpiece portion **630** can include a plurality of baffles **655** that divert airflow within the airflow outlet channel **626**. In some implementations, the baffles **655** can extend across a majority of the cartridge **620** width (e.g., at least half), covering one end of the cartridge **620** width and leaving open a space proximate the opposite end of the cartridge **620** width. Each, subsequent baffle **655**, along the direction of the cartridge airflow path, can be disposed to leave open a space proximate a different end compared to the immediately preceding baffle **655**. For example, if a first baffle **655** is disposed to leave open a space proximate a first side of the cartridge **620** (e.g., a first short side), then a subsequent second baffle **655** is disposed to leave open a space proximate a second side of the cartridge **620** (e.g., a second short side, opposite the first short side along the cartridge **620** width), and this alternating pattern can continue for each subsequent baffle **655**. The open spaces can form part of the airflow path along which the external air and vapor may travel, providing an airflow path with a longer, overall distance compared to an airflow path that travels straight through the mouthpiece portion along the cartridge **620** length.

[0454] As illustrated, the cartridge **620** can include a divider **654** within one, both, or between the mouthpiece portion **620** and the heater portion **641**. As illustrated, the divider **654** can take the form of an upside-down cup, with the solid end proximate the heater portion distal end **641***a* and including vapor inlets **635**. The open end of the divider **654** can face towards the heater portion distal end **641***b*. As illustrated, the perimeter of the divider **654** can include bypass channels **638**, in fluid communication with ambient air. However, instead of being in direct communication with the airflow outlet channel **626**, the bypass channels **638** can be in fluid communication with part of the heater portion **641**, such as the heater chamber.

[0455] In various implementations, the cartridge **620** can include one or more baffles **655** formed as part of one or more filters **624**, which can be stacked on top of each other along the cartridge **620** length. In some implementations, a plurality of filters **624** including baffles **655** can be wrapped together with the end cap **674**, when present, within a layer of material (e.g., wrapper **622**) so that they may be held together to form the mouthpiece portion **630**, and an additional layer of material (e.g., wrapper **622**) can be included that holds the mouthpiece portion **630** together with the heater portion **641** to form the cartridge **620**. In other implementations, the plurality of filters **624** including baffles **655** can be wrapped together within a layer of material (e.g., wrapper **622**) so that they may be held together to form the mouthpiece portion **630**, and an additional layer of material (e.g., wrapper **622**) can be included that holds the mouthpiece portion **630**, the end cap **674** (when present), the heater portion **641**, and the end cap **664** (when present) together to form the cartridge **620**. In either of these sets of implementations, the divider **654** can be included within a layer of material (e.g., wrapper **622**) that forms the mouthpiece portion **620** or can be separate from the mouthpiece portion **620**. The baffles **655** and the open space in each of the filters **624** can be created via a laser-cutting operation through walls of the filters **624** during the manufacturing process.

[0456] In some implementations, instead of the baffles **655** being formed in the illustrated plurality of filters **624**, the baffles **655** or a similar structure can be formed by a material that includes pre-cut holes, and is folded and/or pressed into the mouthpiece portion **630**. For example, similar to the manner in which cardboard is manufactured, the structure can be a singular piece of material that is easy to manufacture and has a predefined pattern.

[0457] The vaporizer cartridge **620**, **620***f* can include the same components of, and otherwise operate in the same manner as, the vaporizer cartridge **620***a* of FIG. **6**A, except as noted. Separately, the components of vaporizer cartridge **620**, **620***f* identified and discussed herein can be combined into any of the other vaporizer cartridges **620** described with respect to FIGS. **6**A-**6**E and/or **6**G-**6**J, except as noted or where impractical.

[0458] Other implementations exist where the filter(s) **624** take up a smaller percentage of the volume in the mouthpiece portion **630** and/or other components are used instead as illustrated in the vaporizer cartridge **620***g* of FIG. **6**G. For example, one or more filters **624** can be disposed within or proximate to an upper region of the mouthpiece portion **630** (e.g., proximate and/or forming at least a portion of the cartridge proximal end **620***x*) and a divider **654** can be disposed in a lower region of the mouthpiece portion **630** (e.g., proximate and/or forming at least a portion of the mouthpiece portion distal end **6300***b*). As illustrated, one or more walls **633** can be provided within the mouthpiece portion **630** to maintain the rigidity of the mouthpiece portion **630** so that it is resistant to deformation under force and/or easier to manufacture. As illustrated, the wall(s) **633** can extend along the cartridge **620** length, between the filter(s) **624** and the divider **654**. The wall(s) **633** define at least a portion of a perimeter of the airflow outlet channel **626** (e.g., substantially all of the perimeter). In some implementations, the airflow outlet channel **626** can be formed between and/or defined by the wall(s) **633** and the filter(s) **624**, and optionally by the divider **654** in implementations where the wall(s) **633** form a hollow shape (e.g., a hollow, flattened cylinder, having an elliptical or oval cross-section).

[0459] In some implementations, the divider **654** can include a solid end, define an open end opposite the solid end, and include a solid boundary that extends between the two ends (e.g., along a perimeter of the divider **654**, where the perimeter can be substantially the same at the solid end and the open end). As illustrated, the divider **654** can be disposed within the mouthpiece portion **630** with the solid end more proximate the cartridge proximal end **620***x* and the open end more proximate and facing the cartridge distal end **620***y*, open to and in fluid communication with the heater chamber in the heater portion **641** (e.g., having an upside-down cup shape). A plurality of vapor inlets **635** can be formed through the solid end of the divider **654**, such that the vaporized material and external air from the heater chamber may enter the airflow outlet chamber **626**.

[0460] In some implementations, the walls **633** can similarly include a solid end, define an open end opposite the solid end, and include a solid boundary that extends between the two ends (e.g., along a perimeter of the walls **633**, where the perimeter can be substantially the same at the solid end and the open end). As illustrated, the divider **654** can be disposed within the mouthpiece portion **630**, with the open end more proximate the cartridge proximal end **620***x* and the closed end more proximate the cartridge distal end **620***y*. In some aspects, the walls **633** can be regarded as having a cup shape. A plurality of bypass outlets **627**, and thereby a plurality of corresponding bypass channels **638** and bypass air inlets **629**, can formed through the solid boundary of the walls **633** (e.g., proximate the solid end), such that ambient air may enter the airflow outlet chamber **626**. Further, a plurality of vapor inlets **635** can be formed through the solid end of the walls **633**, such that the vaporized material and external air from the heater chamber, and more immediately, from the vapor inlets **635** of the divider **654**, may enter the airflow outlet chamber **626**.

[0461] In some implementations the solid end of the walls **633** can abut the solid end of the divider **654**. In some implementations, the vapor inlets **635** and the bypass outlets **627** formed in the divider **654** and the walls **633** can be sized to created a jet-stream effect. For example, in some implementations, each of the vapor inlets **635** and the bypass outlets **627** can be circular holes that are less than 1 mm in diameter, less than 0.5 mm in diameter, or less than 0.25 mm in diameter. In some implementations, each of the vapor inlets **635** and the bypass outlets **627** are the same size. However, in other implementations, the vapor inlets **635** are larger than the bypass outlets **627**, such that the jet stream effect from the ambient air has a stronger effect on the slower-moving air passing through the vapor inlets **635**. The vapor inlets **635** and the bypass outlets **627** can be created via a laser-cutting operation during the manufacturing process.

[0462] The divider **654** and/or wall(s) **633** can take other forms, such as those illustrated in FIG. **6**H. For example, as illustrated, the wall(s) **633** can form a shape around the interior perimeter of the mouthpiece section **630** and/or cartridge **630**, that is open on both ends (e.g., proximate each of the mouthpiece portion distal end **630***b* and the mouthpiece portion proximal end **630***a*), as mentioned above. Separately, the divider **654** can include a boundary wall **656** extending parallel to the cartridge **620** length and around an internal perimeter of the divider **654** and/or cartridge. The boundary wall **656** can include or be formed of a series of bends **657** that successively extend towards and away from the internal perimeter of the divider **654** and/or cartridge **620**. The regions formed where the boundary wall **656** is spaced apart from the internal perimeter of the divider **654** and/or cartridge **620** can be vapor inlets **635**, and the regions where the boundary wall **656** abuts the internal perimeter of the divider **654** and/or cartridge **620** can separate the vapor inlets **635** from each other. As illustrated, the vapor inlets **635** formed by the divider **654** are larger than the adjacent bypass outlets **627**, which can allow the jet-stream effect of ambient air entering the bypass outlets **627** to have a greater effect on the vapor, from the heater chamber, passing through the vapor inlets **635**.

[0463] In some implementations, the divider **654** in either of the cartridges **620***g*, **620***h* of FIGS. **6**G-**6**H can extend out of the distal end of the mouthpiece portion **630** such that it may couple with, be inserted within, and/or touch the exterior of the heater portion **641**. In accordance with these implementations, the divider **654** can be regarded as part of the mouthpiece portion **630** only, as part of both the mouthpiece portion **630** and the heater portion **641**, or may be regarded as an intermediate portion disposed between the mouthpiece portion **630** and the heater portion **641**. For example, in some implementations the filter(s) **624**, wall(s) **633**, and the divider **654** can all be wrapped together in a first wrapper **622** to form the mouthpiece portion **630**, the heating element(s) **642** can be wrapped around the vaporizable material **602** to form the heater portion **641**, and a second wrapper **622** can be wrapped around the mouthpiece portion **630** and the heater portion **641** to form the cartridge **420**.

[0464] The filter **624** can include an air-permeable material such that aerosol may exist the mouthpiece portion **630** and be inhaled by a user, but may provide additional filtration (e.g., active filtration to remove constituent parts of the aerosol). The filter **624** can include material such as one or more of paper material such as cardstock, corrugated material such as cardboard or paper, tobacco paper, temperature-resistant plastic, cellulose acetate, non-wood plant fibers such as flax, hemp, sisal, rice straw, and/or esparto, and/or the like. The vaporizer cartridges **620**, **620***g*, **620***h* can include the same components of, and otherwise operate in the same manner as, the vaporizer cartridge **620***a* of FIG. **6**A, except as noted. Separately, the components of vaporizer cartridge **620**, **620***g*, **620***h* identified and discussed herein can be combined into any of the other vaporizer cartridges **620** described with respect to FIGS. **6**A-**6**F, **6**I, and/or **6**J, except as noted or where impractical.

[0465] Although non-cylindrical cartridges **220**, **320**, **420**, **620***a-i* and components of corresponding vaporizer bodies for use with non-cylindrical cartridges are illustrated and described with respect to FIGS. **2**, **3**, **4**A-4Q, **5**A-5G, **6**A-6I, cylindrical cartridges such as the cartridge **620***j* of FIG. **6**J can be utilized. FIG. **6**J illustrates multiple views of the cartridge **620***j*, including a perspective view of the exterior, a partially transparent view into the interior, and a cross-sectional view taken along section D-D of the perspective view. As illustrated, the cartridge **620***j* extends from a cartridge proximal end **620***x* to a cartridge distal end **620***y*, and includes a heater portion **641** and mouthpiece portion **630**. The heater portion **641** extends from a heater portion proximal end **641***a* to a heater portion distal end **641***b* and includes vaporizable material **602** surrounded by a heating element **642** and an end cap **664** (e.g., filter, insert). The mouthpiece portion **630** extends from a mouthpiece portion proximal end **630***a* to a mouthpiece portion distal end **630***b* and includes a filter **624**. Optionally, the heater portion **641** and mouthpiece portion **630** can be individually wrapped with one or more layer of material (e.g., wrappers **622**) and/or a coupled together with an exterior layer of material (e.g., wrapper **622**), as described herein.

[0466] As illustrated, the filter **624** includes a plurality of bypass channels **638** extending between respective bypass air inlets **629** and bypass outlets **627**. Each bypass channel **638** is illustrated as being in fluid communication with a singular airflow outlet channel **626**, extending between a vapor inlet **635** at or near the mouthpiece portion distal end **630***b* (and/or the heater portion proximal end **641***a*) and an airflow outlet **628** at or near the mouthpiece portion proximal end **630***a*. Although two bypass channels **638** are illustrated at opposing sides of the filter **624**, in series along the length of the mouthpiece portion **630** for a total of four bypass channels **638**, different numbers of bypass channels **638** can be present at different locations, such as two total, six total, eight total, etc. bypass channels **638**, which can optionally be positioned off-axis from each other along the length of the mouthpiece portion **630**. Although a singular airflow outlet channel **626** is illustrated, two or more airflow outlet channels **626** can be present.

[0467] Use of a cylindrical cartridge **620** can simplify manufacture relative to a non-cylindrical cartridge. Accordingly, to take advantages of this simplified manufacture while still achieving the benefits of non-cylindrical cartridges described herein, in some implementations the cartridge **620** can be first manufactured as a cylinder and then flattened to some degree to form a non-cylindrical cartridge **620**. In some implementations, a cylindrical cartridge can be formed with a diameter of 5 mm to 6 mm, and optionally approximately 5.5 mm. A diameter within this range can be advantageous, as it minimizes the distance between the heating element **642** and a center of vaporizable material **602**, while still providing space for a volume of vaporizable material **602** that is sufficient to deliver an amount of an active substance (e.g., nicotine) desirable to a user (e.g., a user of combustible cigarettes). In some implementations, if a non-cylindrical cartridge **620** is used, the cartridge can be formed as a cylinder with a diameter of 6 mm to 8 mm, and optionally approximately 7 mm. Subsequently, the cylinder can be pressed and/or flattened into a non-cylindrical shape having a width of 8 mm to 10 mm (e.g., approximately 8.75 mm) and a depth of 5 mm to 6 mm (e.g., approximately 5.5 mm). In some implementations, a non-cylindrical cartridge **620** can be manufactured, without pressing and/or flattening, with a width of 8 mm to 10 mm (e.g., approximately 8.75 mm) and a depth of 5 mm to 6 mm (e.g., approximately 5.5 mm). In each implementation, the diameter, width, and depth can be regarded as measurements of a cross-section of the cartridge **620**, which can optionally be substantially the same for all cross-sections between the cartridge proximal end **620***x* and the cartridge distal end **620***y*.

[0468] The vaporizer cartridge **620**, **620***j* can include similar components to, and otherwise operate in the same manner as, the vaporizer cartridge **620***a* of FIG. **6**A, except as noted. Separately, the components of vaporizer cartridge **620**, **620***j* identified and discussed herein can be combined with any of the components of the other vaporizer cartridges **620** described with respect to FIGS. **6**A-**6**I, except as noted or where impractical.

[0469] FIGS. **7**A-**7**D illustrate a process for manufacturing a vaporizer cartridge **720**, as perspective views of the vaporizer cartridge **720** and/or its components. As illustrated in FIG. **7**A, a vaporizable material **702** can be formed into specific shape, such as a shape that has a cross-section similar to one or more of the cross-sections of FIGS. **8**A-**8**F. As illustrated in FIG. **7**B, a heating element **742** can be wrapped around the vaporizable material **702** to form a heater portion **741** that has the same specific shape. However, in some implementations the heating element is first formed into a shape that is configured to receive the vaporizable material **702**, and the vaporizable material **702** is subsequently fit into this shape.

[0470] As described herein, the heating element **742** can be a single sheet of metal that is wrapped around the perimeter of the heater portion **741**, with the ends of the sheet meeting in a joint location (not illustrated). The ends of the sheet can placed on top of each other and glued together, bent inwards towards the vaporizable material **702** (e.g., at approximately right angles) and glued together, formed into complementary shapes that are designed to interlock, and/or the like.

[0471] Although not illustrated, the process for manufacturing the vaporizer cartridge **720** can include forming a mouthpiece portion **730**, such as by laser-cutting one or more airflow outlet channels through a inserts **742***a*, as described herein. However, other implementations are described herein that do not include airflow outlet channels through a filter, and manufacturing the differently-designed mouthpiece portions **730** as part of the process of manufacturing the cartridge **720** is within the scope of this disclosure.

[0472] As illustrated in FIG. **7**C, the heater portion **741** and the mouthpiece portion **730** can be held (e.g., wrapped) together in a layer of material (e.g., wrapper **722**). In some implementations, a second filter **724***b* can be disposed at a cartridge distal end **720***b* and/or a third filter **724***c* can be disposed at a cartridge proximal end **720***c*. Although implementations are described herein that include only one or neither of the second and third filters **724***b*, **724***c*, as illustrated, the second filter **724***b* can be held (e.g., wrapped) within the layer of material (e.g., wrapper **722**) at the cartridge distal end **720***b* and the third filter **724***c* can be held (e.g., wrapped) within the layer of material (e.g., wrapper **722**) at the cartridge proximal end **720***a*.

[0473] Whatever components are assembled within the cartridge **720**, as illustrated in FIG. **7**D, a plurality of vapor inlets **735** can be formed within the mouthpiece portion **730**, through the layer of material (e.g., wrapper **722**). As described herein, these vapor inlets **735** can be in fluid communication with one or more condensation chambers, such as through bypass channels, and configured to allow passage of ambient air into the one or more condensation chambers.

[0474] Alternative processes for manufacturing a vaporizer cartridge **720**, are contemplated, such as the process of manufacturing the vaporizer cartridge **720***e* illustrated in FIG. **7**E. As illustrated, the mouthpiece portion **730** can be formed by wrapping a first filter **724***a*, a third filter **724***c*, and/or a fourth filter **724***d* within a first wrapper **722***a*. The first filter **724***a* can be the same or similar to the first filter **624***a* of FIG. **6**E, the third filter **724***c* can be the same or similar to the end cap **674** of FIG. **6**E, and/or the fourth filter **724***d* can be the same or similar to the second filter **624***b* of FIG. **6**E. The heater portion **741** can be formed by wrapping vaporizable material **702** within a heating element **742** and/or wrapping a second filter **724***b* within a second wrapper **722***b*. For example, the second filter **724***b* may not be wrapped with its own wrapper **722** and/or can have a cross-section that is substantially the same size as the cross-section of the heating element **742** when it is wrapped around the vaporizable material **702**. The second filter **724***b* can be the same or similar to the end cap **664** of FIG. **6**D. As illustrated, the second filter **724***b* can optionally include a plurality of cartridge inlets **725** (e.g., two, three, four, five, etc. through-holes) extending through the second filter **724***b*, from an exterior of the cartridge **720***e* to the vaporizable material **702**. The mouthpiece portion **730** and the heater portion **741** can be wrapped with a third wrapper **772***c* to form the cartridge **720***e*. After the mouthpiece portion **730** and the heater portion **741** are wrapped together, a plurality of vapor inlets **735** can be formed within the mouthpiece portion **730**, through the third wrapper **722***c*, the first wrapper **722***a*, and/or the fourth filter **724***d*, such as by laser cutting.

[0475] The process of manufacturing the cartridge **720***e* can be otherwise the same or similar to the manufacturing of the cartridge **720** illustrated and described with respect to FIGS. **7**A-**7**D. Additionally or alternatively, the vaporizer cartridges **720**, **720***e* of FIGS. **7**A-**7**E can include similar components to, and otherwise operate in the same manner as, the vaporizer cartridges **620** described with respect to FIGS. **6**A-**6**J, except as noted or where impractical.

[0476] If the heating element of a cartridge is manufactured such that it includes a joint location (see e.g., the joint location **345** of FIG. **3**), this joint location can interfere with the overall performance of a vaporizer device configured to heat the heating element via induction. Although a position of the joint seam can be dictated by manufacturing the joint seam to be in a known or specified location, manufacture of the cartridges can be simplified if the position of the joint seam is not dictated. Separately, if the cartridge is cylindrical, there is no way to dictate the location of the joint seam without creating user friction (e.g., requiring the user to place the cylindrical cartridge in a specific location every time). Accordingly, it can be desirable to mitigate the effect of the joint location, such as by detecting a position of the joint location and/or manufacturing the joint location to have a certain shape or structure (see FIGS. **15**A-**15**E).

[0477] For example, as illustrated in FIGS. **14**A-**14**C, a joint location **1445** of a heating element **1442** can be positioned proximate a center of an inductor **1443** (noted as 0° in FIG. **14**A), positioned between a center of the inductor **1443** and an end of the inductor **1443** (noted as **300** in FIG. **14**B), positioned proximate or outside an end of the inductor **1443** (noted as **600** in FIG. **14**C), and/or the like. The closer the joint location **1445** is to the center of the inductor, the worse the performance of the inductor **1443** (e.g., lower thermal efficiency). Accordingly, in some implementations, the relative position of the joint location **1445** can be detected and the power provided to the inductor(s) **1443** that are near joint location **1445** can be reduced.

[0478] For example, inductance and/or resistance values of the heating element **1442** can be measured as described herein. The inductance and/or resistance values of the heating element **1442** derived from each inductor **1443** can then be compared to determine a location of the joint location **1445**. For example, the inductance and/or resistance values can be averaged, and the inductor **1443** with inductance and/or resistance values that are furthest from the average inductance and/or resistance can be determined as being the inductor **1443** proximate the joint location **1445**. Based on this determination, less power can be applied to the inductor **1443** determined to be proximate the joint location **1445**, such as by decreasing the duty cycle of power applied to the inductor **1443** (e.g., reducing the overall time during which power is applied to the inductor **1443**) relative to a baseline duty cycle and/or duty cycle applied to the other inductors **1443**, decreasing the operating frequency of the inductor **1443** relative to a baseline frequency and/or frequency of the other inductors **1443**, decreasing the voltage applied to the inductor **1443** relative to a baseline voltage and/or voltage of the other inductors **1443**, and/or the like. In some implementations, it can be determined that joint location **1445** is proximate two different inductors **1443**. In this case, power applied the two inductors **1443** determined to be proximate the joint location **1445** can be reduced. In some implementations, the reduction in power applied to each inductor **1443** determined to be proximate the joint location **1445** can be reduced based on proximity of each inductor to the joint location. As such, a greater reduction in power can be applied to the inductor **1443** determined to be closer to the joint location **1445** than the reduction in power to the inductor **1443** determined to be further from the joint location **1445**.

[0479] FIGS. **10**A-**10**D illustrates top perspective views of vaporizer device **1000**, consistent with implementations of the current subject matter. As illustrated in FIG. **10**A, a vaporizer device **1000*a*** can include a vaporizer body **1010** and a cartridge **1020** configured to be inserted into a receptacle **1018** of the vaporizer body **1010**. The cartridge **1020** can include at least one airflow outlet **1028**, though which an inhalable aerosol may be inhaled by a user. In some implementations, the intersection between the cartridge **1020** and the receptacle **1018** into which it is inserted may provide an airflow inlet **1024**, such as around a perimeter of the intersection, through which ambient air may enter the receptacle **1018**, and thereafter enter the cartridge **1020** at a cartridge distal end, when a user puffs on the cartridge through the at least one airflow outlet **1028**.

[0480] Additionally or alternatively one or more outputs **1017** in the form of at least one LED (e.g., in the form of a plurality of LEDs arranged in a line) can be disposed on the exterior of the vaporizer body **1010** and/or one or more input devices **1016** in the form of a button can be disposed on the top ledge **1021** of the vaporizer body **1010** (e.g., proximate and on the same face as the cartridge receptacle **1018**). As illustrated, the width of the vaporizer body **1010** can be two to three times the width of the cartridge (as cartridge width has been used herein), with the receptacle **1018** proximate one end of the ledge **1021** and the input device **1016** proximate the opposite side of the ledge **1021**.

[0481] As illustrated in FIG. **10**B, a vaporizer device **1000*b*** can include a vaporizer body **1010** and a cartridge **1020** configured to be inserted into a receptacle **1018** that is centered on the ledge **1021** of the vaporizer body **1010**. With relatively less space on the ledge **1021**, the one or more input devices **1016** (e.g., button) can be disposed on one of the wider faces of the vaporizer body **1010** (e.g., proximate the distal end of the vaporizer body **1010** and on the same side of the vaporizer device **1000*b*** as one of the long sides of the cartridge **1020**, as long sides have been used herein) and/or on one of the more narrow faces of the vaporizer body **1010** (e.g., proximate the distal end of the vaporizer body **1010** or proximate the proximate end of the vaporizer body **1010**, and on the same side of the vaporizer device **1000*b*** as one of the short sides of the cartridge **1020**, as short sides have been used herein).

[0482] Although the cartridge **1020** and/or the vaporizer body **1010** can be generally rectangular (cuboid) with rounded edges, as illustrated by the vaporizer devices **1000*a***, **1000*b*** of FIGS. **10**A-**10**B, in other implementations the cartridge **1020** and/or the vaporizer body **1010** can include a cross-section that has an elliptical or oval shape, as illustrated by the vaporizer devices **1000*c***, **1000*d*** of FIGS. **10**C-**10**D. As further illustrated in FIG. **10**D, the one or more outputs **1017** (e.g., LEDs) and/or one or more input devices **1016** (e.g., buttons) can be disposed at different locations of the exterior of the vaporizer body **1010** and/or take different shapes. For example, a cross-section of the cartridge **1020** and/or the vaporizer body **1010** can be similar to one or more of the cross-sections of FIGS. **8**A-**8**F.

Terminology

[0483] It will be appreciated that the terms "proximal" and "distal" are used herein to refer to relative locations of the referenced devices and/or components. Although "proximal" is generally used to refer to a location that is at or near a user when the device and/or component is in use, and "distal" is generally used to refer to a location that is away from a user when the device and/or component is in use, these terms are not intended to be absolute. For example, a "proximal" end and/or a "distal" end of a component need not be the absolute furthest points on the referenced ends, and can instead refer to a general region at or near the referenced end. Further, opposing "proximal" ends and "distal" ends of a component need not be completely and/or perfectly opposite each other, as the shapes of each end may differ and/or the component may not be perfectly linear (e.g., one or more longitudinal dimensions of the component may be of different lengths).

[0484] When a feature or element is herein referred to as being "on" another feature or element, it can be directly on the other feature or element or intervening features and/or elements may also be present. In contrast, when a feature or element is referred to as being "directly on" another feature or element, there are no intervening features or elements present. It will also be understood that, when a feature or element is referred to as being "connected", "attached" or "coupled" to another feature or element, it can be directly connected, attached or coupled to the other feature or element or intervening features or elements may be present. In contrast, when a feature or element is referred to as being "directly connected", "directly attached" or "directly coupled" to another feature or element, there are no intervening features or elements present.

[0485] Although described or shown with respect to one implementation, the features and elements so described or shown can apply to other implementations. It will also be appreciated by those of skill in the art that references to a structure or feature that is disposed "adjacent" another feature may have portions that overlap or underlie the adjacent feature.

[0486] Terminology used herein is for the purpose of describing particular implementations and implementations only and is not intended to be limiting. For example, as used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, steps, operations, elements, components, and/or groups thereof. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items and may be abbreviated as "/".

[0487] In the descriptions above and in the claims, phrases such as "at least one of" or "one or more of" may occur followed by a conjunctive list of elements or features. The term "and/or" may also occur in a list of two or more elements or features. Unless otherwise implicitly or explicitly contradicted by the context in which it used, such a phrase is intended to mean any of the listed elements or features individually or any of the recited elements or features in combination with any of the other recited elements or features. For example, the phrases "at least one of A and B;" "one or more of A and B;" and "A and/or B" are each intended to mean "A alone, B alone, or A and B together." A similar interpretation is also intended for lists including three or more items. For example, the phrases "at least one of A, B, and C;" "one or more of A, B, and C;" and "A, B, and/or C" are each intended to mean "A alone, B alone, C alone, A and B together, A and C together, B and C together, or A and B and C together." Use of the term "based on," above and in the claims is intended to mean, "based at least in part on," such that an unrecited feature or element is also permissible.

[0488] Spatially relative terms, such as "forward", "rearward", "under", "below", "lower", "over", "upper" and the like, may be used herein for ease of description to describe one element or feature's relationship to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if a device in the figures is inverted, elements described as "under" or "beneath" other elements or features would then be oriented "over" the other elements or features. Thus, the exemplary term "under" can encompass both an orientation of over and under. The device may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein interpreted accordingly. Similarly, the terms "upwardly", "downwardly", "vertical", "horizontal" and the like are used herein for the purpose of explanation only unless specifically indicated otherwise.

[0489] Although the terms "first" and "second" may be used herein to describe various features/elements (including steps), these features/elements should not be limited by these terms, unless the context indicates otherwise. These terms may be used to distinguish one feature/element from another feature/element. Thus, a first feature/element discussed below could be termed a second feature/element, and similarly, a second feature/element discussed below could be termed a first feature/element without departing from the teachings provided herein.

[0490] As used herein in the specification and claims, including as used in the examples and unless otherwise expressly specified, all numbers may be read as if prefaced by the word "about" or "approximately," even if the term does not expressly appear. The phrase "about" or "approximately" may be used when describing magnitude and/or position to indicate that the value and/or position described is within a reasonable expected range of values and/or positions. For example, a numeric value may have a value that is +/−0.1% of the stated value (or range of values), +/−1% of the stated value (or range of values), +/−2% of the stated value (or range of values), +/−5% of the stated value (or range of values), +/−10% of the stated value (or range of values), etc. Any numerical values given herein should also be understood to include about or approximately that value, unless the context indicates otherwise. For example, if the value "10" is disclosed, then "about 10" is also disclosed. Any numerical range recited herein is intended to include all sub-ranges subsumed therein. It is also understood that when a value is disclosed that "less than or equal to" the value, "greater than or equal to the value" and possible ranges between values are also disclosed, as appropriately understood by the skilled artisan. For example, if the value "X" is disclosed the "less than or equal to X" as well as "greater than or equal to X" (e.g., where X is a numerical value) is also disclosed. It is also understood that the throughout the application, data is provided in a number of different formats, and that this data, represents endpoints and starting points, and ranges for any combination of the data points. For example, if a particular data point "10" and a particular data point "15" are disclosed, it is understood that greater than, greater than or equal to, less than, less than or equal to, and equal to 10 and 15 are considered disclosed as well as between 10 and 15. It is also understood that each unit between two particular units are also disclosed. For example, if 10 and 15 are disclosed, then 11, 12, 13, and 14 are also disclosed.

[0491] Although various illustrative implementations are described above, any of a number of changes may be made to various implementations without departing from the teachings herein. For example, the order in which various described method steps are performed may often be changed in alternative implementations, and in other alternative implementations one or more method steps may be skipped altogether. Optional features of various device and system implementations may be included in some implementations and not in others. Therefore, the foregoing description is provided primarily for exemplary purposes and should not be interpreted to limit the scope of the claims.

[0492] One or more aspects or features of the subject matter described herein can be realized in digital electronic circuitry, integrated circuitry, specially designed application specific integrated circuits (ASICs), field programmable gate arrays (FPGAs) computer hardware, firmware, software, and/or combinations thereof. These various aspects or features can include implementation in one or more computer programs that are executable and/or interpretable on a programmable system including at least one programmable processor, which can be special or general purpose, coupled to receive data and instructions from, and to transmit data and instructions to, a storage system, at least one input device, and at least one output device. The programmable system or computing system may include clients and servers. A client and server are generally remote from each other and typically interact through a communication network. The relationship of client and server arises by virtue of computer programs running on the respective computers and having a client-server relationship to each other.

[0493] These computer programs, which can also be referred to programs, software, software applications, applications, components, or code, include machine instructions for a programmable processor, and can be implemented in a high-level procedural language, an object-oriented programming language, a functional programming language, a logical programming language, and/or in assembly/machine language. As used herein, the term "machine-readable medium" refers to any computer program product, apparatus and/or device, such as for example magnetic discs, optical disks, memory, and Programmable Logic Devices (PLDs), used to provide machine instructions and/or data to a programmable processor, including a machine-readable medium that receives machine instructions as a machine-readable signal. The term "machine-readable signal" refers to any signal used to provide machine instructions and/or data to a programmable processor. The machine-readable medium can store such machine instructions non-transitorily, such as for example as would a non-transient solid-state memory or a magnetic hard drive or any equivalent storage medium. The machine-readable medium can alternatively or additionally store such machine instructions in a transient manner, such as for example, as would a processor cache or other random access memory associated with one or more physical processor cores.

[0494] The examples and illustrations included herein show, by way of illustration and not of limitation, specific implementations in which the subject matter may be practiced. As mentioned, other implementations may be utilized and derived there from, such that structural and logical substitutions and changes may be made without departing from the scope of this disclosure. Such implementations of the inventive subject matter may be referred to herein individually or collectively by the term "invention" merely for convenience and without intending to voluntarily limit the scope of this application to any single invention or inventive concept, if more than one is, in fact, disclosed. Thus, although specific implementations have been illustrated and described herein, any arrangement calculated to achieve the same purpose may be substituted for the specific implementations shown. This disclosure is intended to cover any and all adaptations or variations of various implementations. Combinations of the above implementations, and other implementations not specifically described herein, will be apparent to those of skill in the art upon reviewing the above description.

1. A cartridge for use with a vaporizer device for generating an inhalable aerosol, the cartridge comprising:
- a heater portion comprising:
  - a heating element configured to heat a vaporizable material to generate a vapor, the heating element defining at least a portion of a perimeter of a heater chamber containing the vaporizable material; and
  - one or more cartridge inlets configured to allow external air to enter the heater chamber and entrain the vapor; and
- a mouthpiece portion comprising:
  - at least one vapor inlet;
  - at least one bypass air inlet;
  - one or more airflow outlet channels in fluid communication with the heater chamber through the at least one vapor inlet, the one or more airflow outlet channels in fluid communication with ambient air through the least one bypass air inlet, the one or more airflow outlet channels comprising at least one condensation chamber configured to condense the entrained vapor with the ambient air to form at least a portion of the inhalable aerosol; and
  - at least one airflow outlet configured to deliver the inhalable aerosol to a user, the at least one airflow outlet in fluid communication with the at least one condensation chamber.

2.-**65**. (canceled)

66. A method for assembling a cartridge, the method comprising:
- forming a heater portion comprising:
  - a vaporizable material;
  - a heating element configured to heat the vaporizable material to generate a vapor, the heating element defining at least a portion of a perimeter of a heater chamber containing the vaporizable material; and
  - one or more cartridge inlets configured to allow external air to enter the heater chamber and entrain the vapor; and
- forming a mouthpiece portion comprising:
  - at least one vapor inlet;
  - at least one bypass air inlet;
  - one or more airflow outlet channels in fluid communication with the heater chamber through the at least one vapor inlet, the one or more airflow outlet channels in fluid communication with ambient air through the at least one bypass air inlet, the one or more airflow outlet channels comprising at least one condensation chamber configured to condense the entrained vapor with the ambient air to form at least a portion of the inhalable aerosol; and
  - at least one airflow outlet configured to deliver the inhalable aerosol to a user, the at least one airflow outlet in fluid communication with the at least one condensation chamber.

67.-**74**. (canceled)

75. A vaporizer device for generating an inhalable aerosol, the vaporizer device comprising:

the cartridge of claim **1**; and

a device body comprising a receptacle configured to insertably receive the cartridge.

76.-**83**. (canceled)

84. A vaporizer device for generating an inhalable aerosol, the vaporizer device comprising:

a heating element configured to heat a vaporizable material to generate a vapor;

at least one inductive coil configured to generate a magnetic and/or electromagnetic field to heat the heating element;

a controller configured to:

apply power to the at least one inductive coil to generate the magnetic and/or electromagnetic field;

derive an inductance and a resistance of the at least one inductive coil; and

adjust the power applied to the at least one inductive coil based on the derived inductance and resistance of the at least one inductive coil.

85.-**131**. (canceled)

132. A device for generating an inhalable aerosol, the device comprising:

a cartridge comprising:

a vaporizable material;

a heater chamber;

a heating element configured to heat the vaporizable material to generate a vapor, the heating element comprising a susceptor;

one or more cartridge inlets configured to allow external air to enter the heater chamber and entrain the vapor;

one or more airflow outlet channels in fluid communication with the heater chamber, the one or more airflow outlet channels comprising at least one condensation chamber configured to condense the entrained vapor with ambient air to form at least a portion of the inhalable aerosol; and

at least one airflow outlet configured to deliver the inhalable aerosol to a user, the at least one airflow outlet in fluid communication with the at least one condensation chamber; and

a device body comprising:

a receptacle configured to insertably receive the cartridge; and

circuitry configured to control heating of the heating element, the circuitry comprising at least one inductive coil configured to generate a magnetic and/or electromagnetic field.

133.-**138**. (canceled)

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