US 20250262653A1

(19) **United States**

(12) **Patent Application Publication**

Parenteau et al.

(10) **Pub. No.: US 2025/0262653 A1**

(43) **Pub. Date: Aug. 21, 2025**

(54) **ORGANIC MATTER PROCESSING APPARATUS WITH OPEN LID PREVENTION AND METHODS OF USE THEREOF**

(71) Applicant: **Chewie Labs LLC**, San Bruno, CA (US)

(72) Inventors: **Hannah Parenteau**, San Jose, CA (US); **Blake Wolf**, Costa Mesa, CA (US); **Nicholas Gregorich**, San Francisco, CA (US)

(21) Appl. No.: **19/055,350**

(22) Filed: **Feb. 17, 2025**

Related U.S. Application Data

(60) Provisional application No. 63/715,534, filed on Nov. 2, 2024, provisional application No. 63/554,383, filed on Feb. 16, 2024, provisional application No. 63/559,759, filed on Feb. 29, 2024, provisional application No. 63/575,091, filed on Apr. 5, 2024.

Publication Classification

(51) **Int. Cl.**

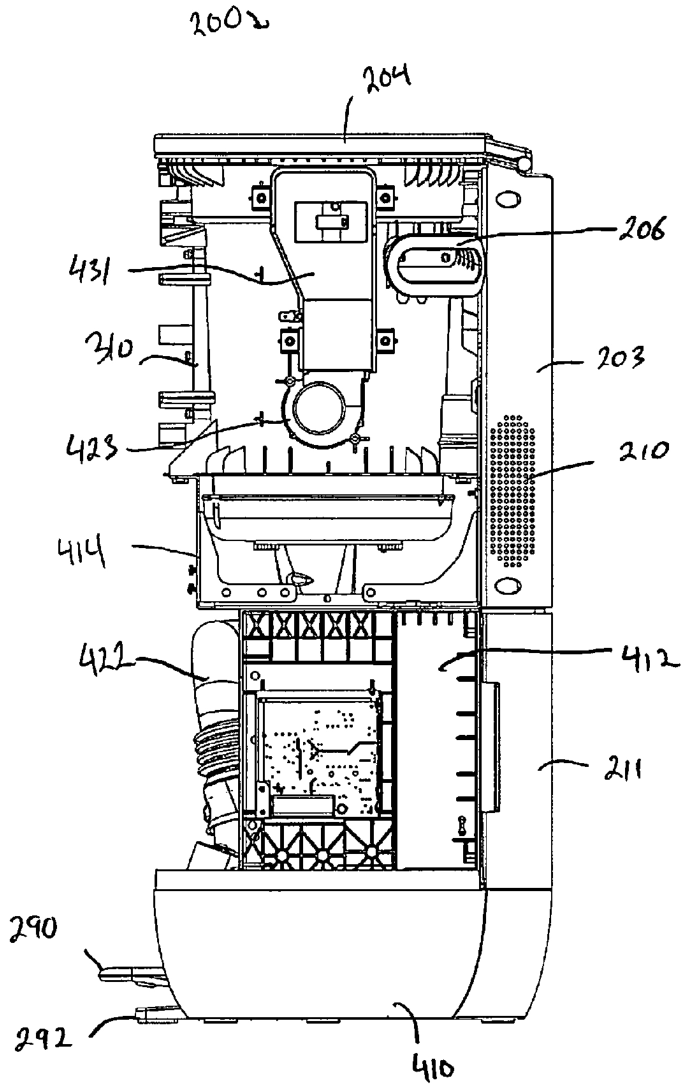
B09B 3/35 (2022.01)
B09B 3/40 (2022.01)
B09B 101/70 (2022.01)

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

CPC ***B09B 3/35*** (2022.01); ***B09B 3/40*** (2022.01); *B09B 2101/70* (2022.01)

(57) **ABSTRACT**

Embodiments disclosed herein provide an organic matter processing apparatus and method for the use thereof to convert organic matter into a ground and substantially dried product. The apparatus uses a bucket assembly that can grind, paddle, and heat organic matter contained therein. The bucket assembly can employ logic to pre-empt inadvertent opening of the lid due to OMPA input pressing up on the lid during OMPA processing.



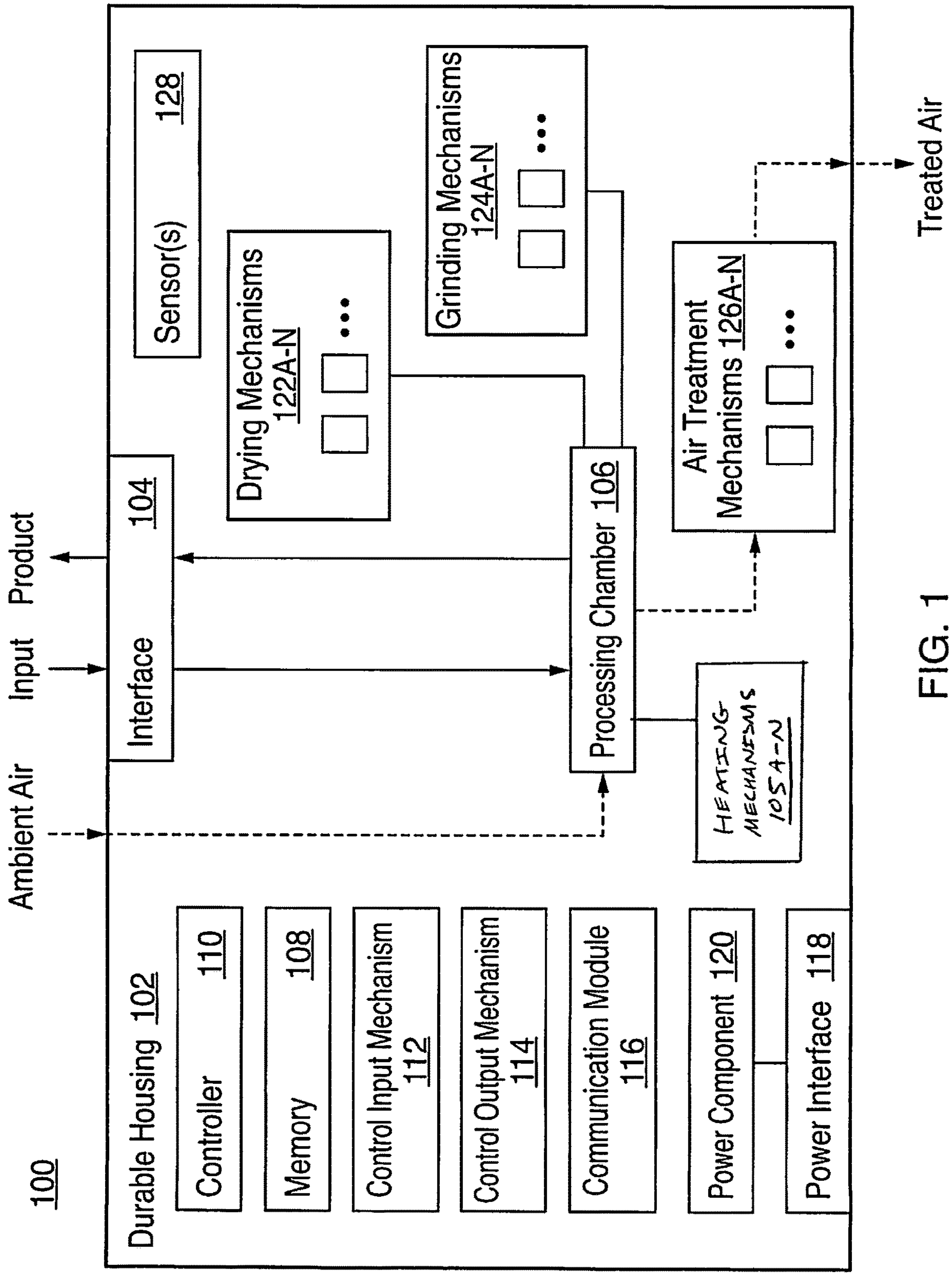

100
Ambient Air
Input
Product
Durable Housing 102
Controller 110
Memory 108
Control Input Mechanism 112
Control Output Mechanism 114
Communication Module 116
Power Component 120
Power Interface 118
Interface 104
Sensor(s) 128
Drying Mechanisms 122A-N
Grinding Mechanisms 124A-N
Processing Chamber 106
HEATING MECHANISMS 105A-N
Air Treatment Mechanisms 126A-N
Treated Air

FIG. 1

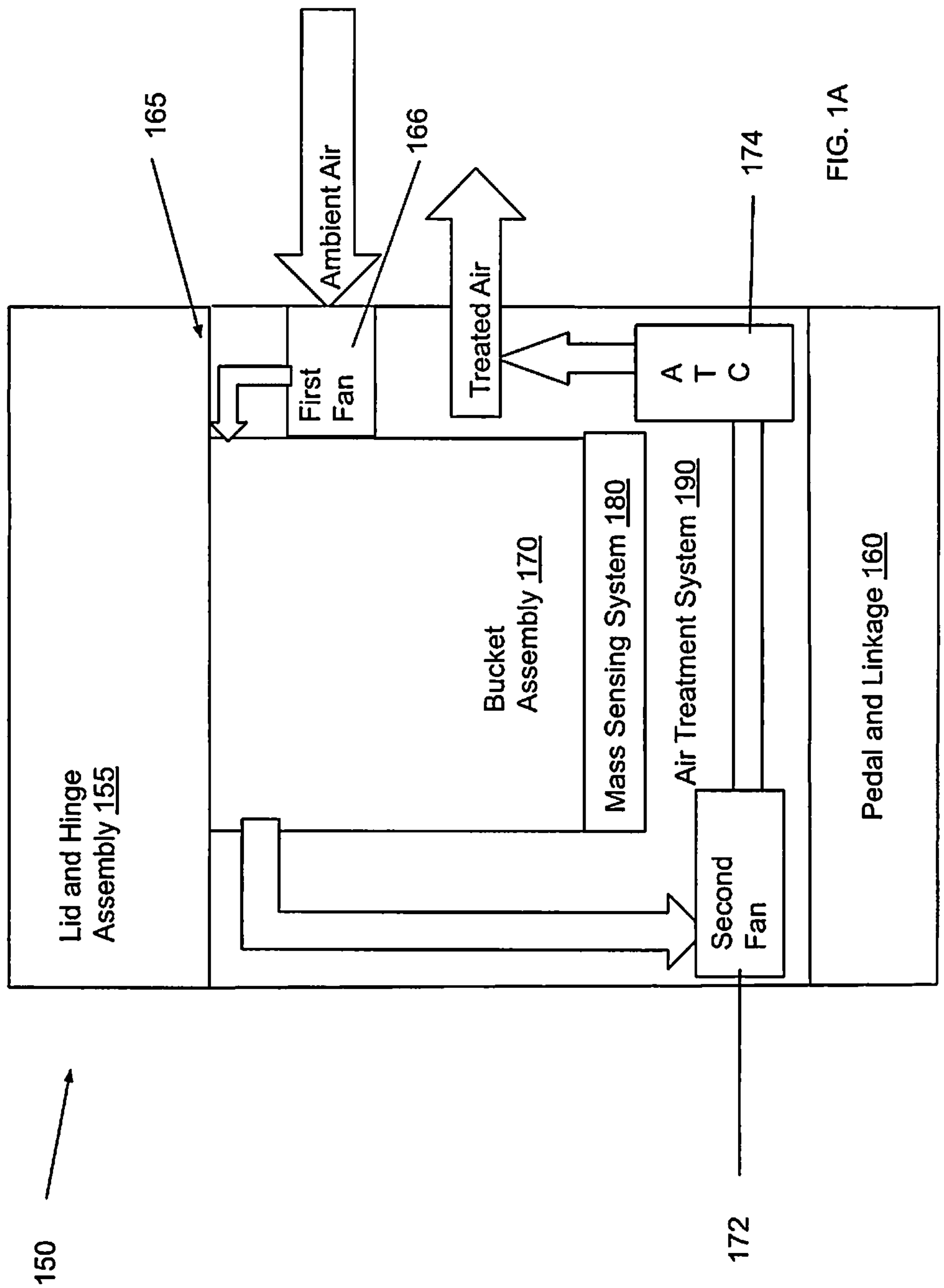

165
Ambient Air
166
Treated Air
174
First Fan
A T C
Bucket Assembly 170
Mass Sensing System 180
Air Treatment System 190
Pedal and Linkage 160
Lid and Hinge Assembly 155
Second Fan
150
172

FIG. 1A

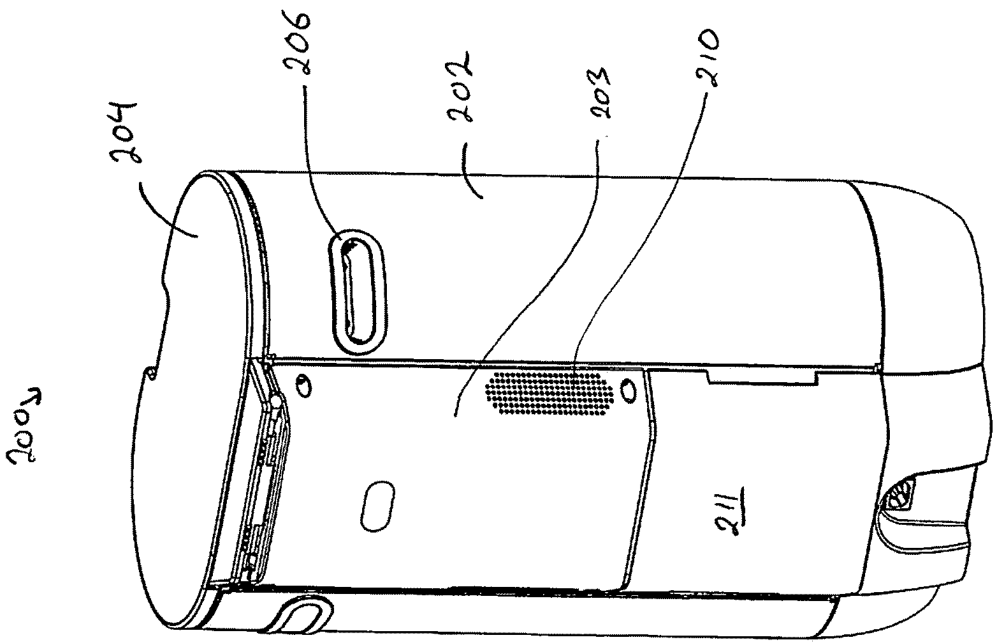


FIG. 2B

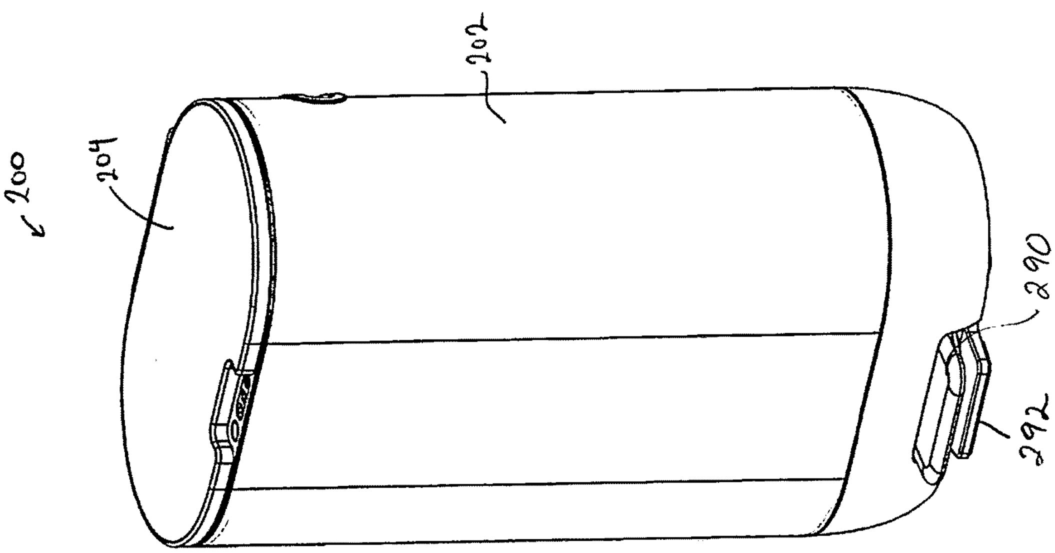


FIG. 2A

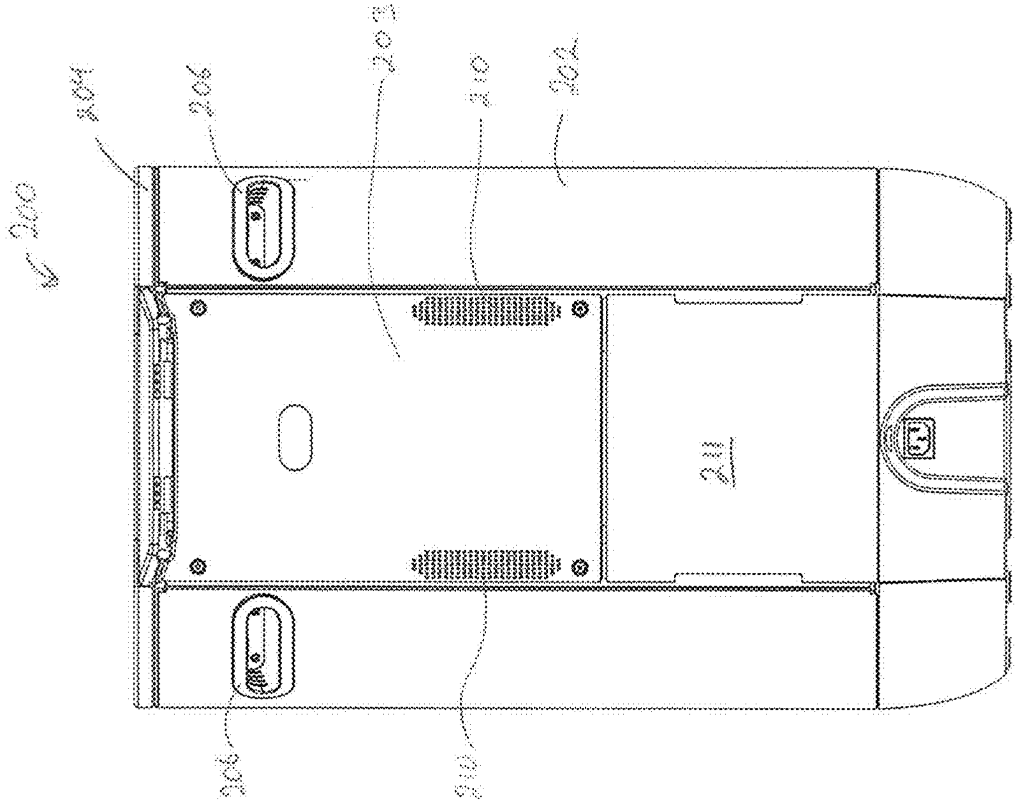


FIG. 2D

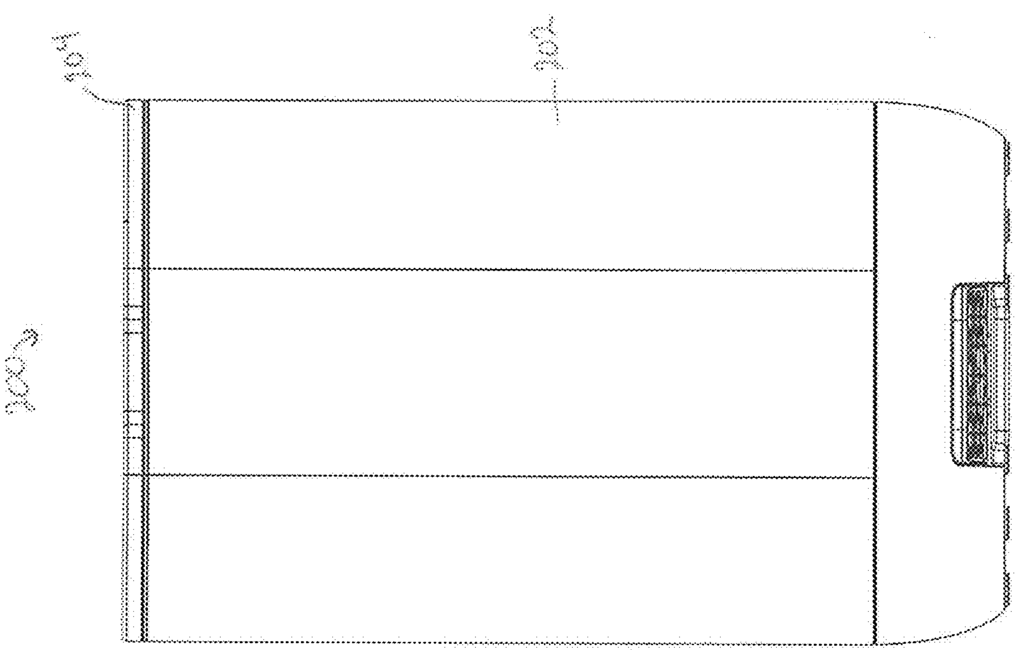


FIG. 2C

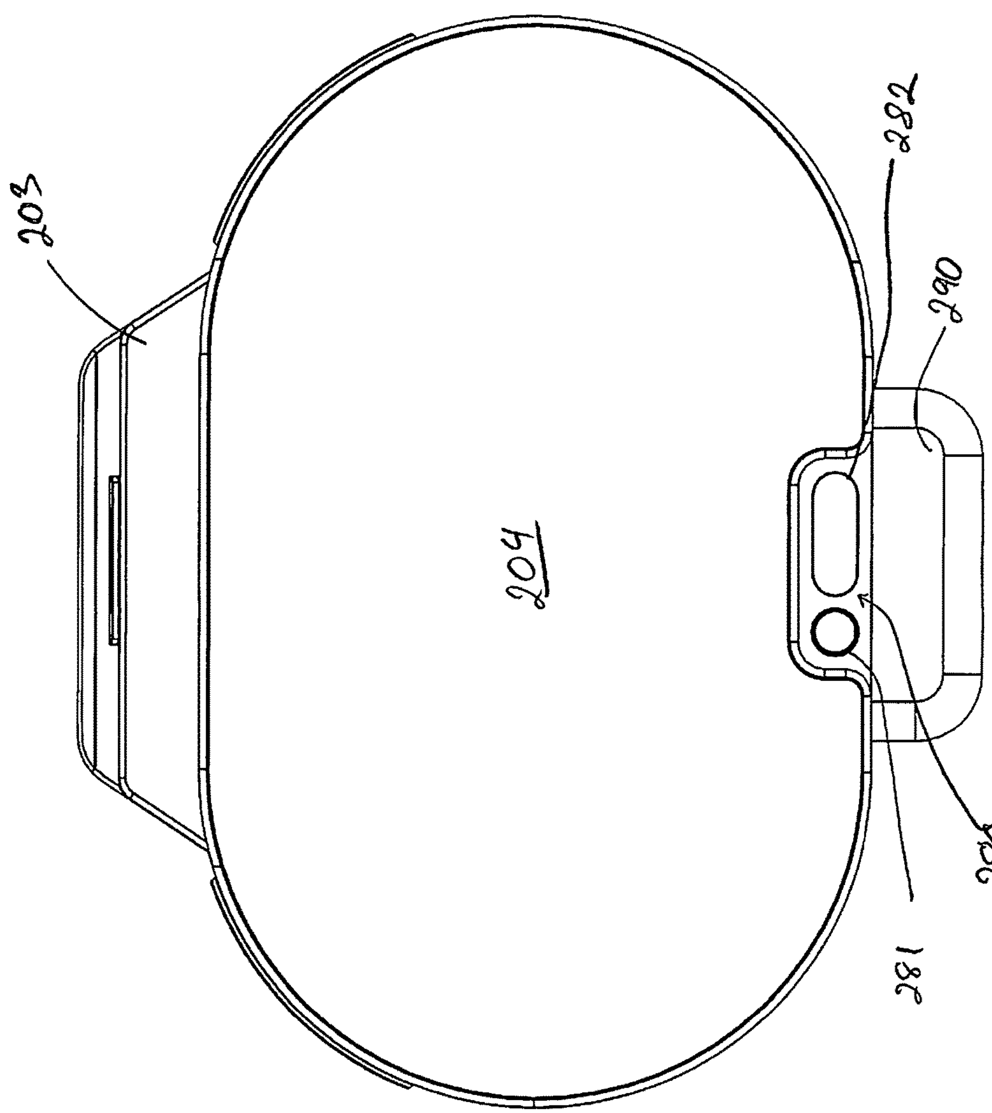


FIG 2E

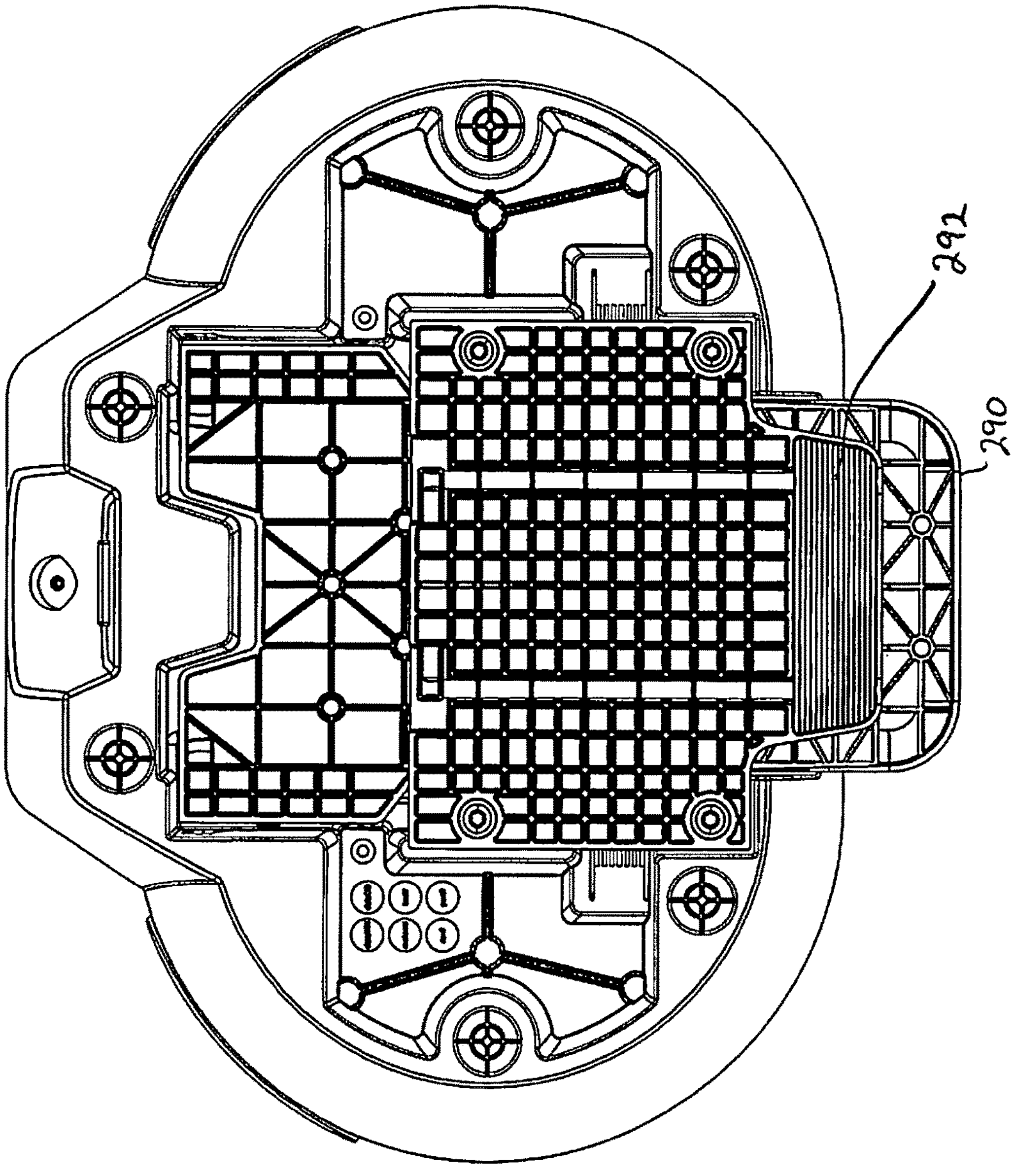


FIG. 2F

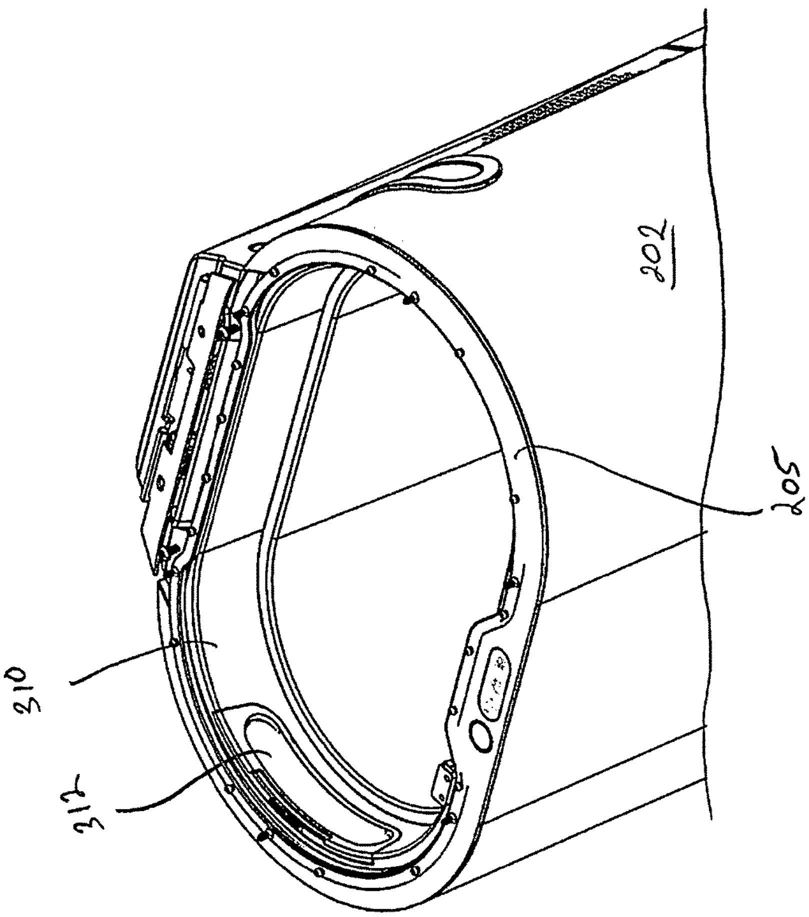


FIG. 3B

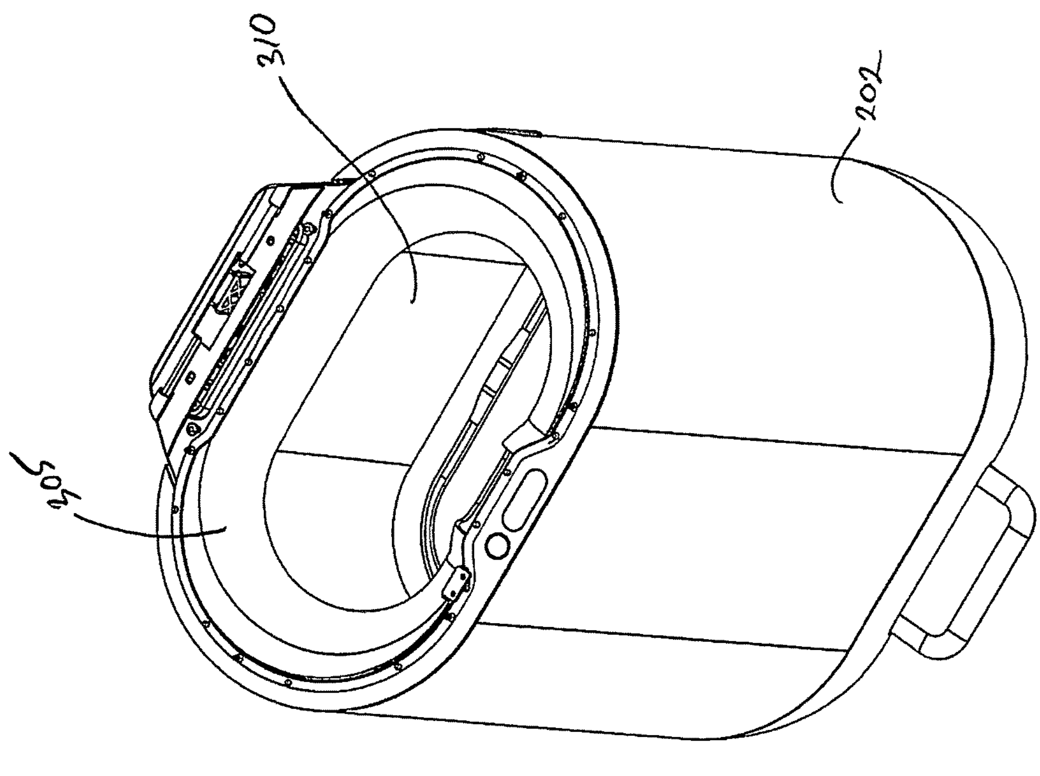


FIG. 3A

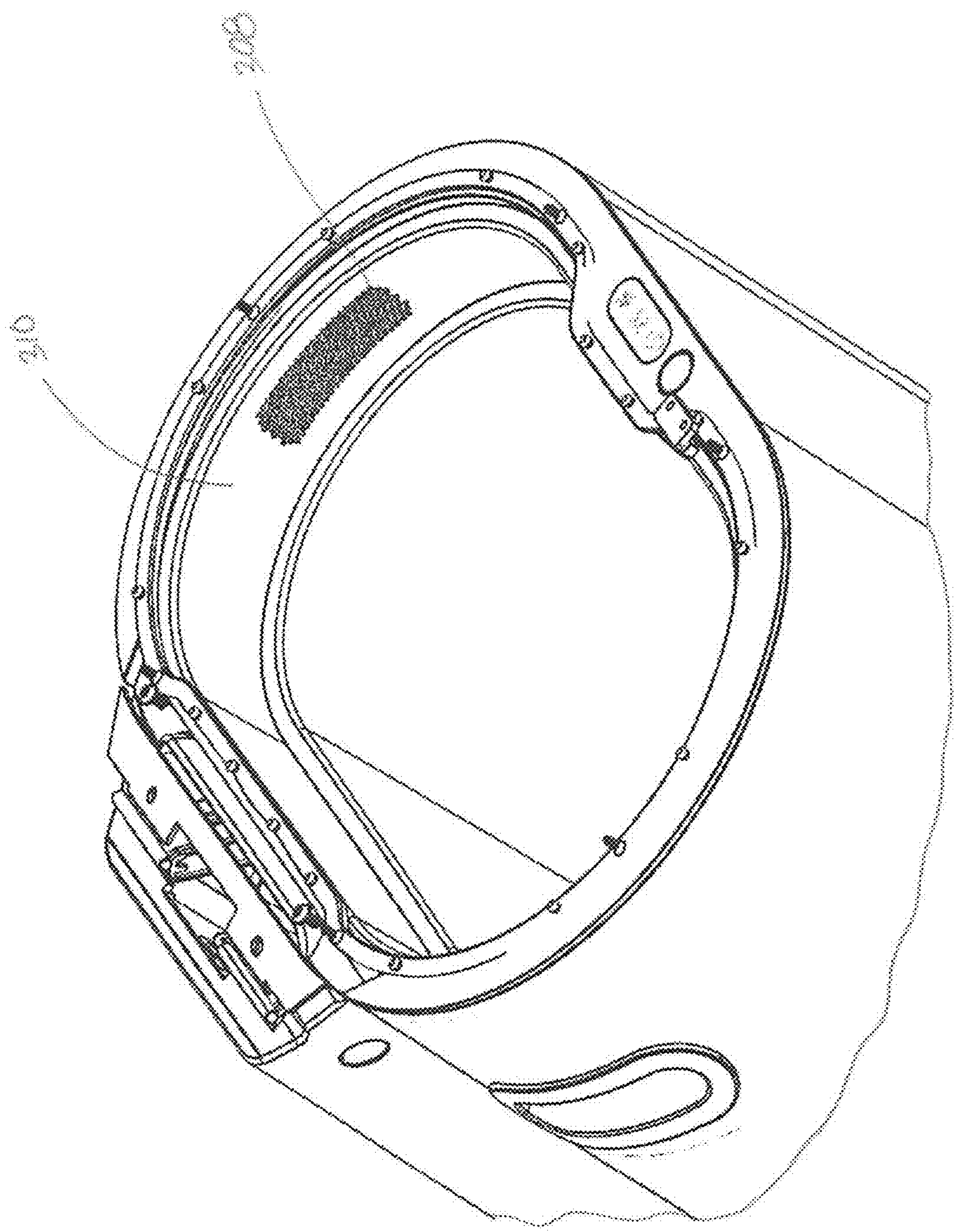


FIG. 3C

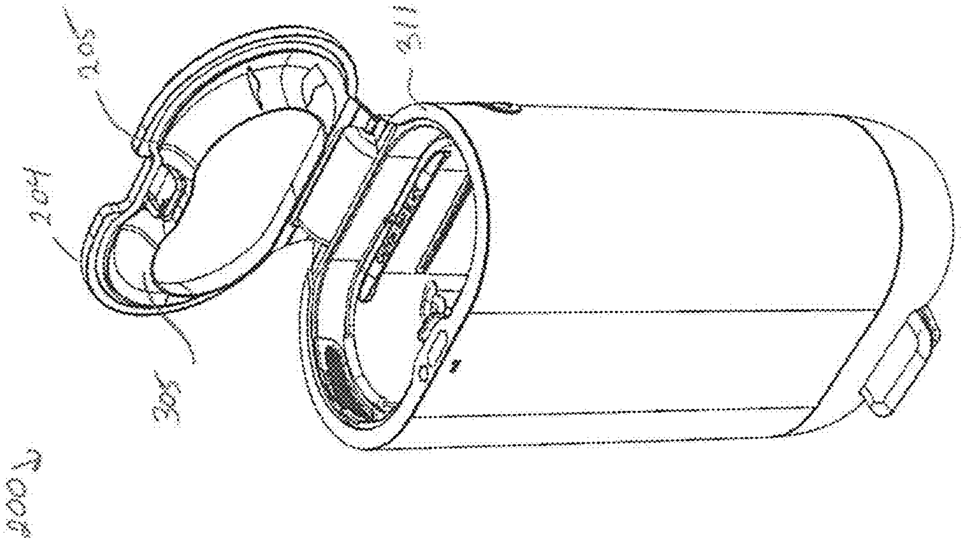


FIG. 3E

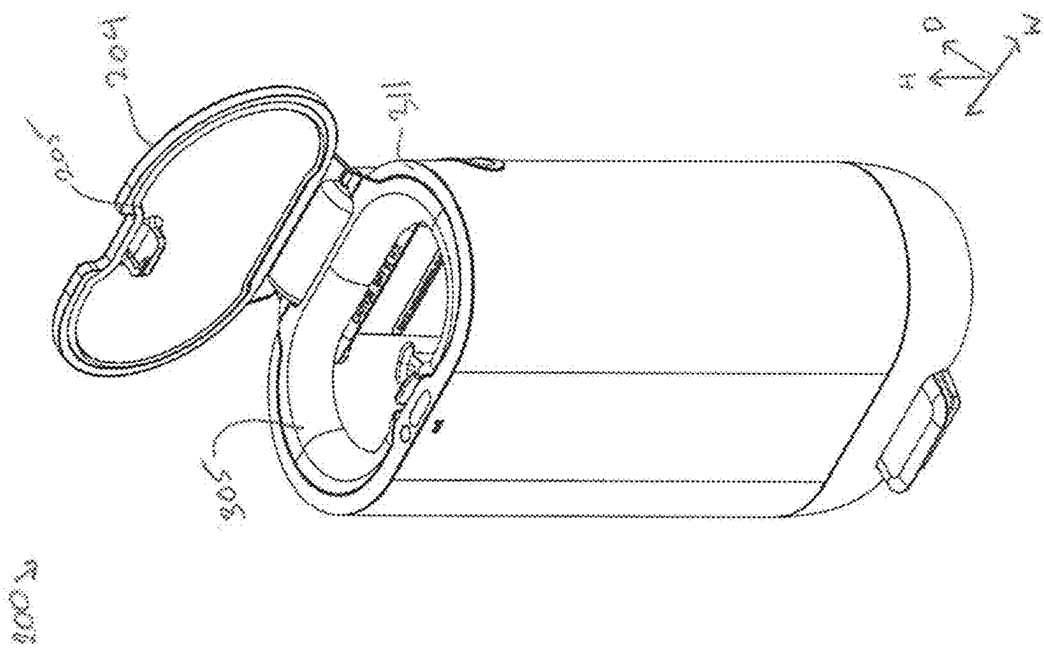


FIG. 3D

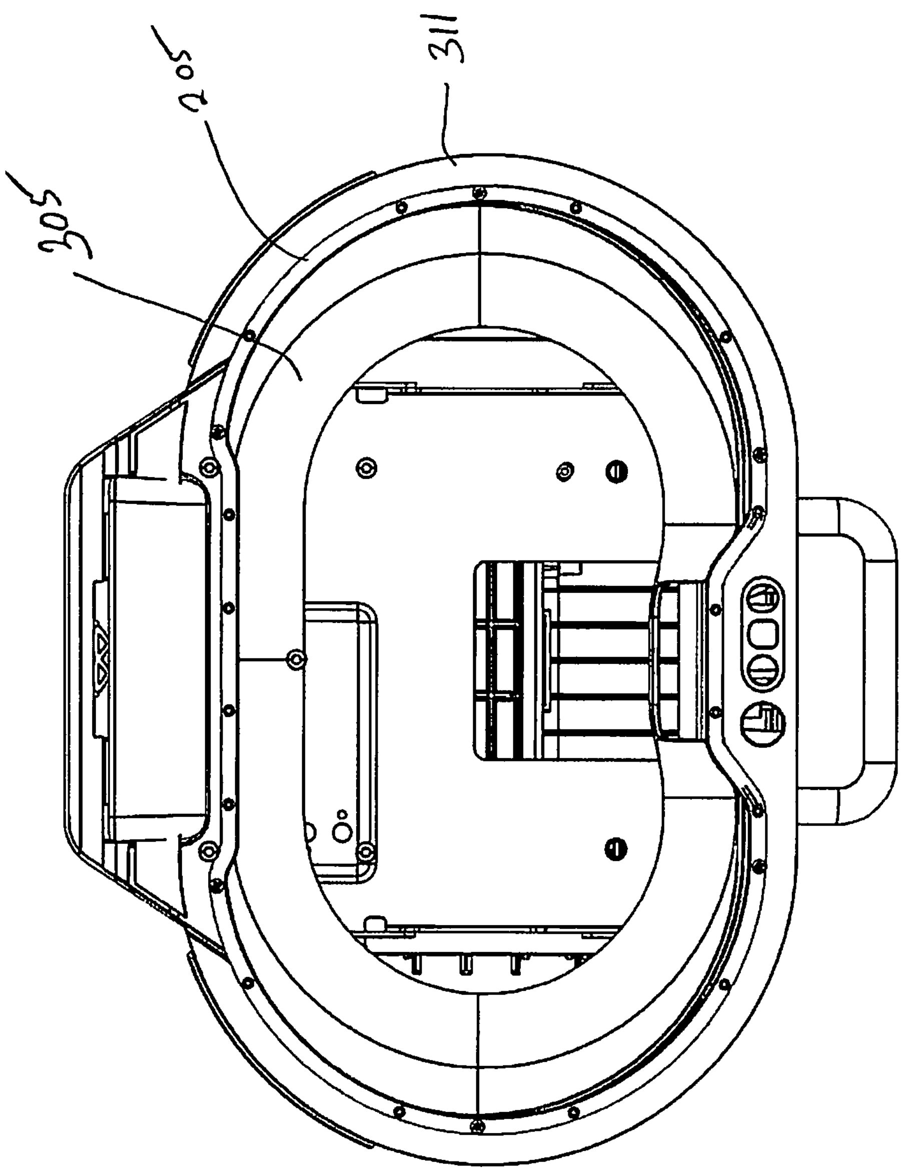


FIG. 3F

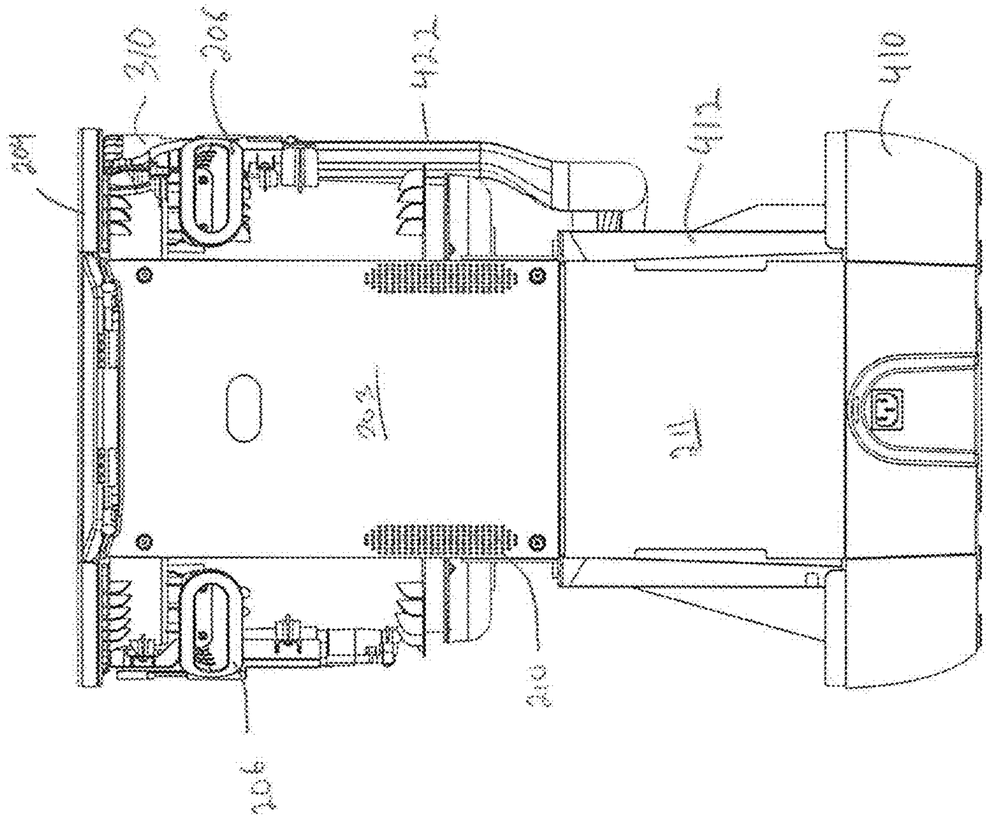


FIG. 4B

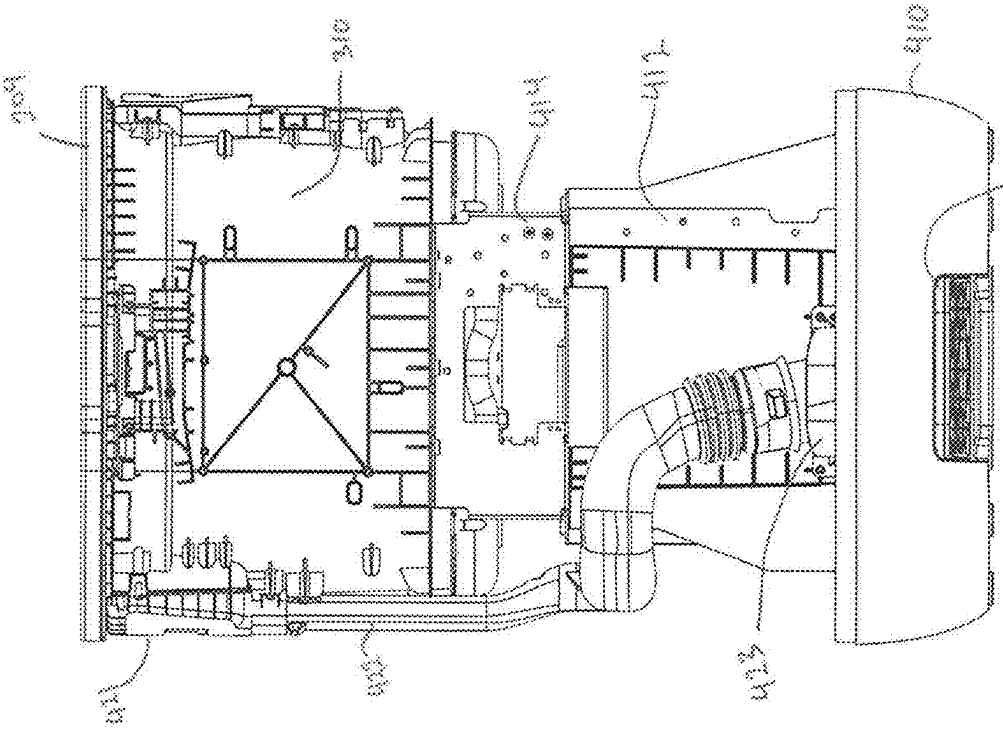


FIG. 4A

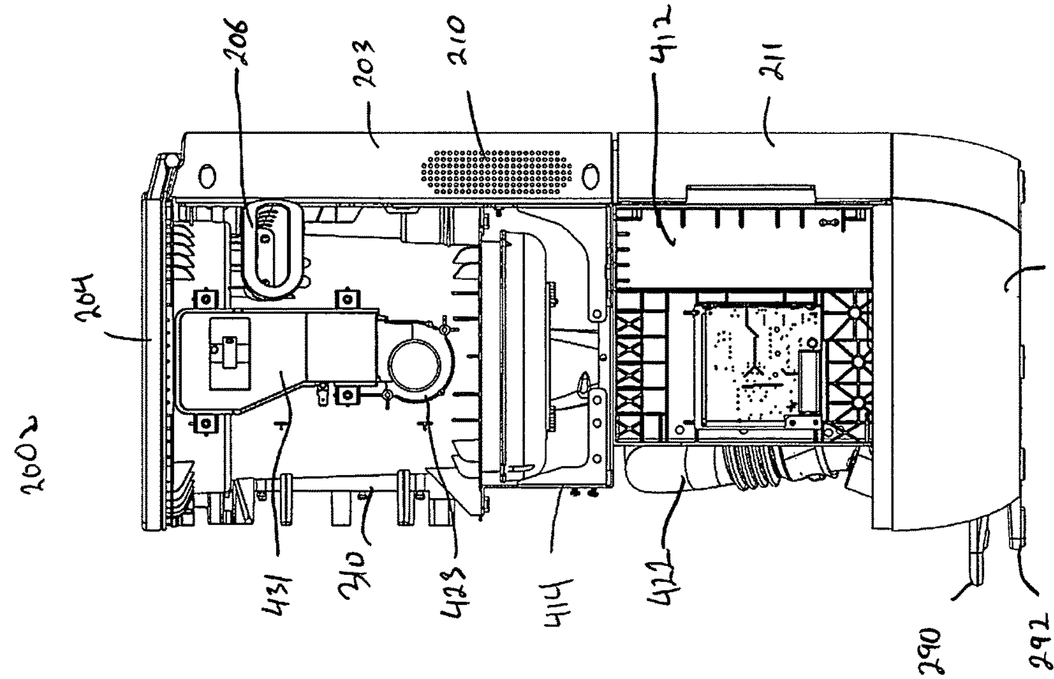

200
204
206
203
210
412
211
410
431
310
423
414
422
290
292

FIG. 4D

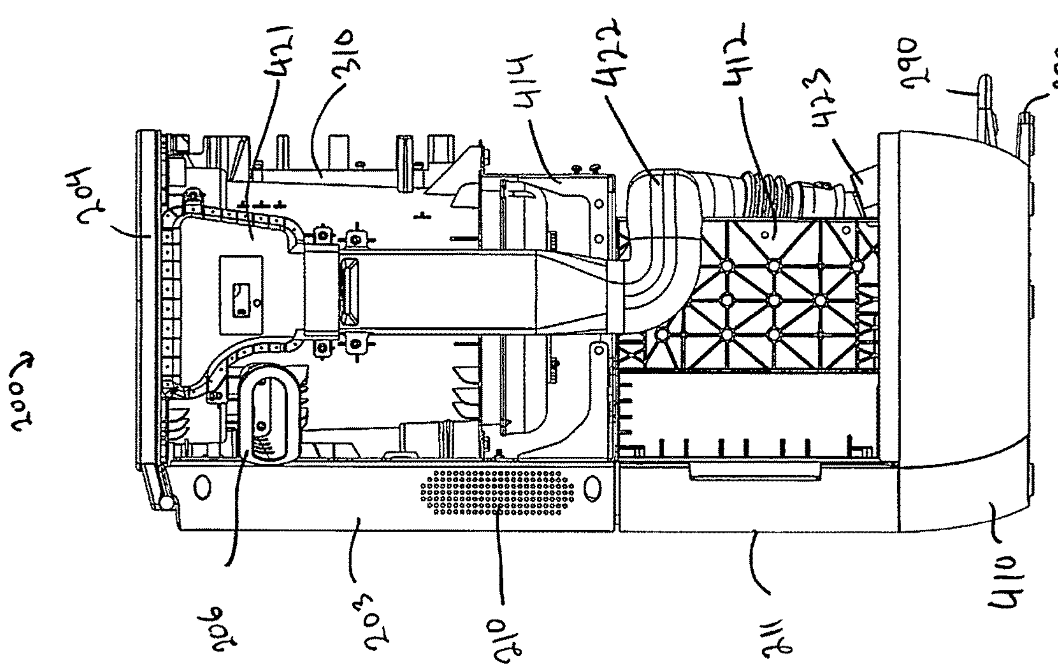

200
204
421
310
414
422
412
423
290
292
206
203
210
211
410

FIG. 4C

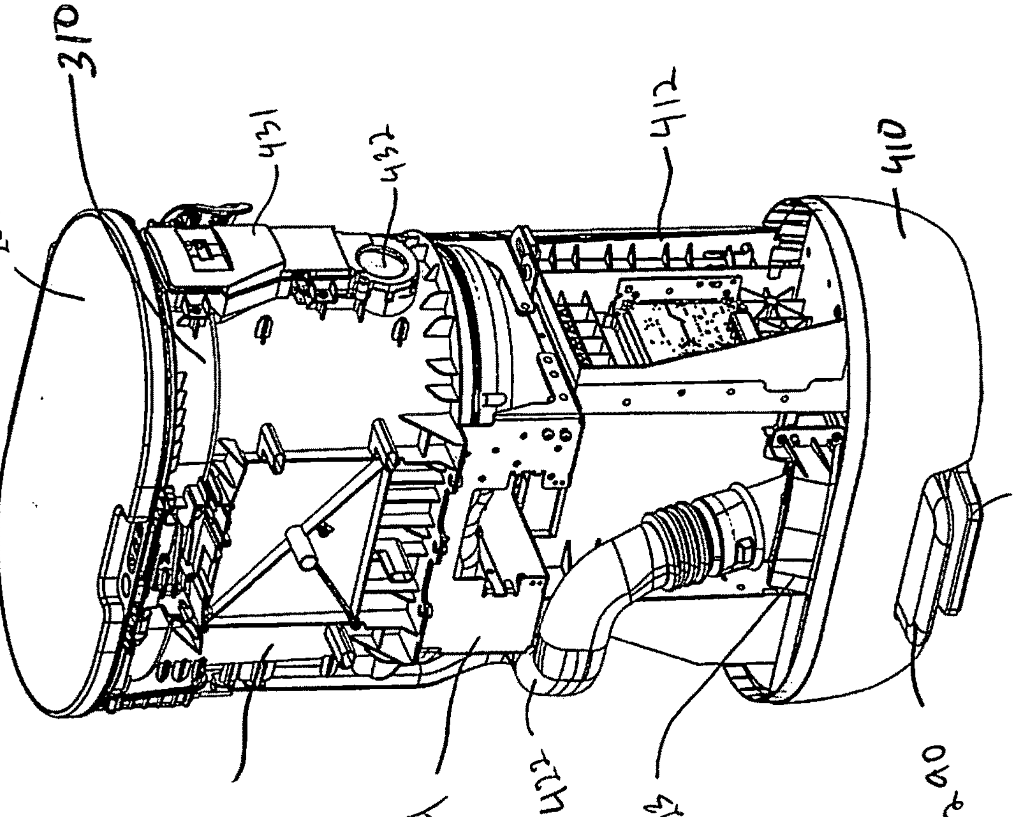


FIG. 4E

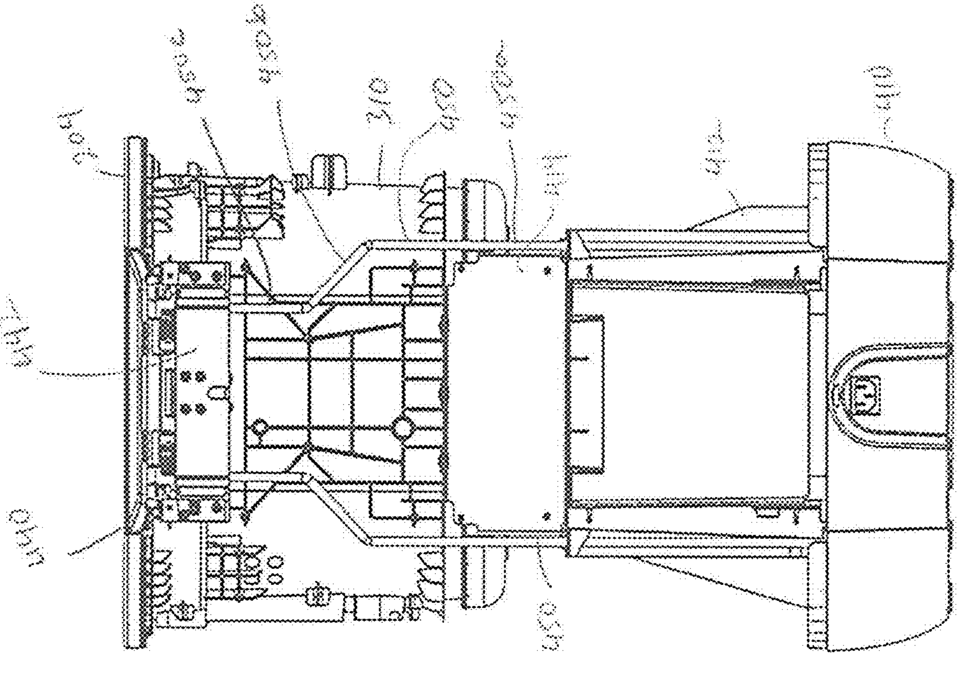


FIG. 4G

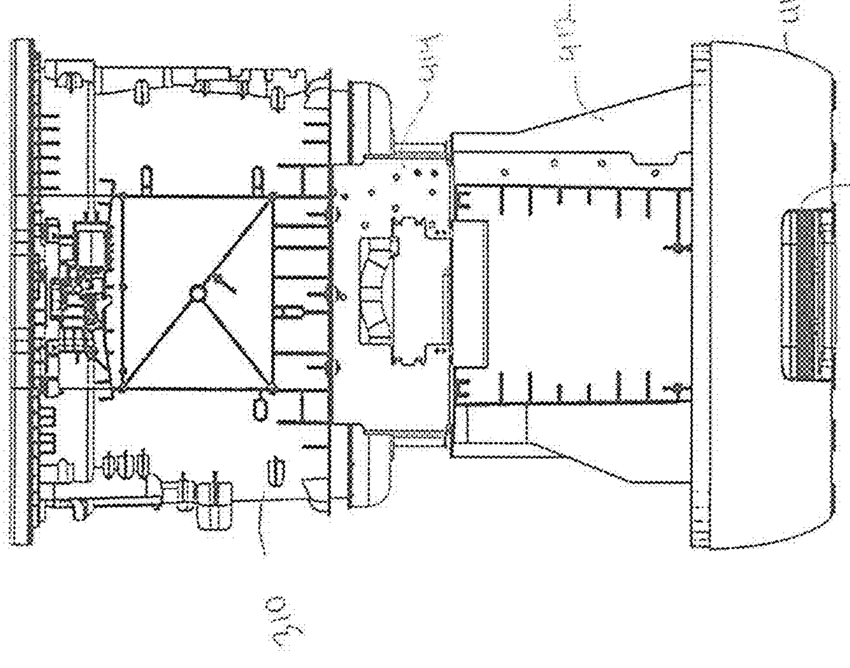


FIG. 4F

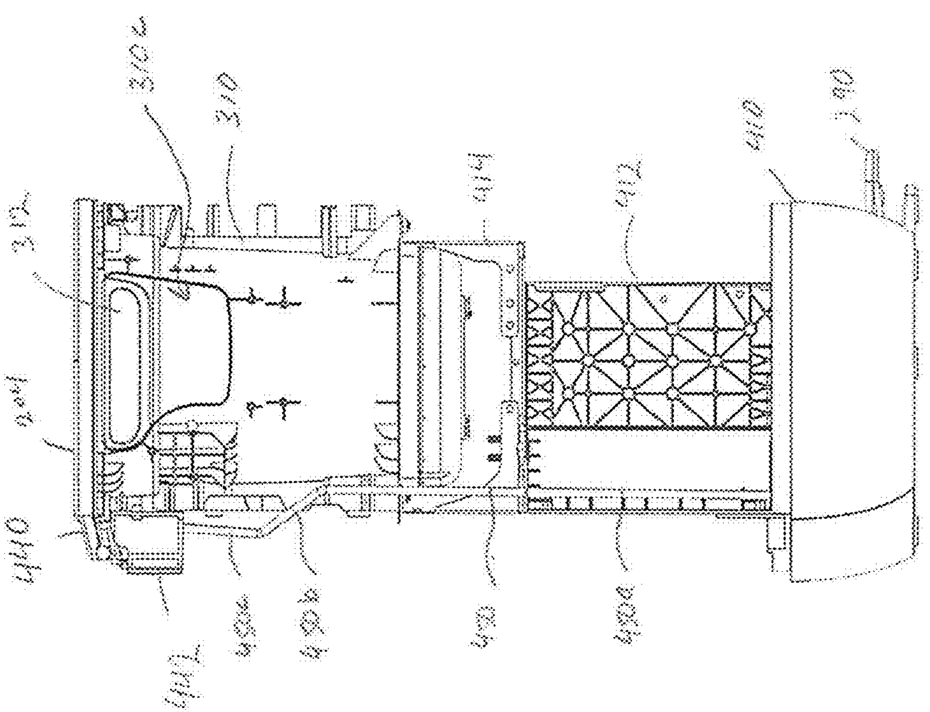


FIG. 4I

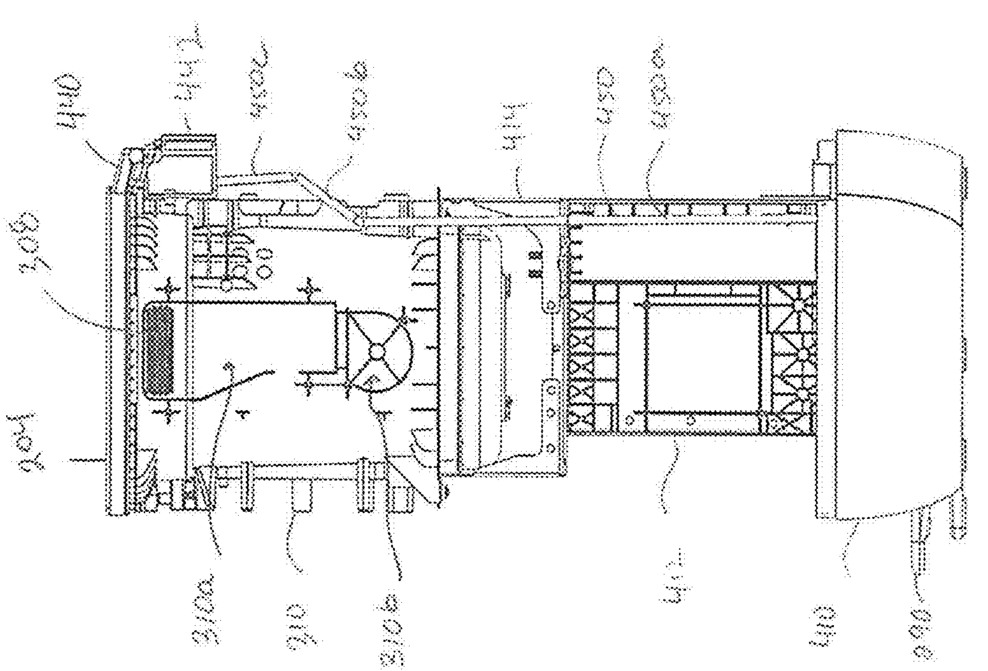


FIG. 4H

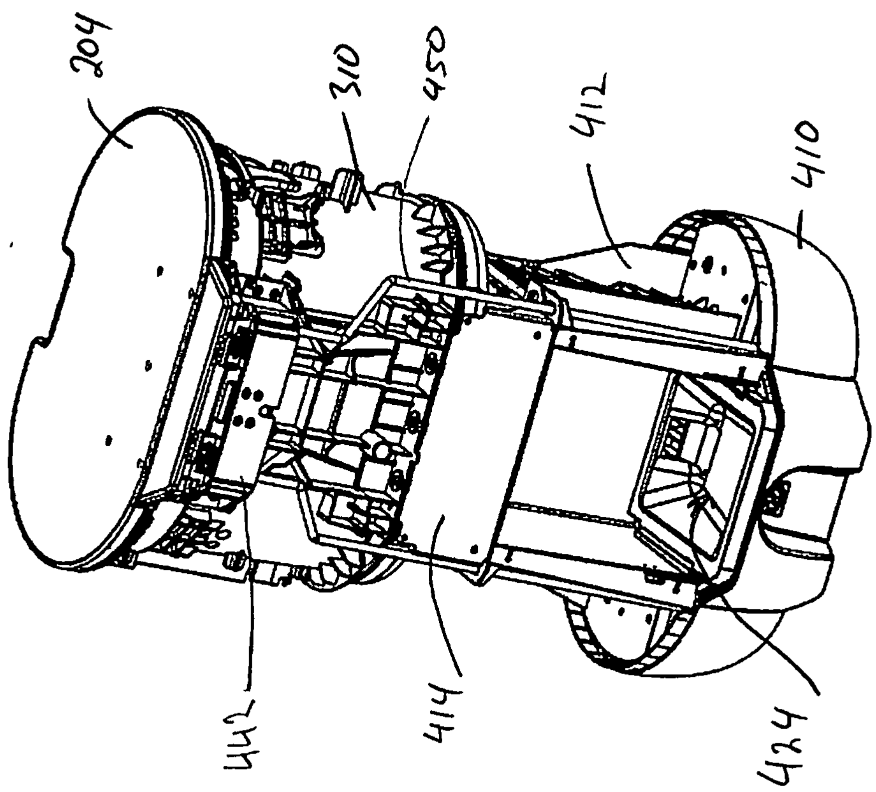


FIG. 45

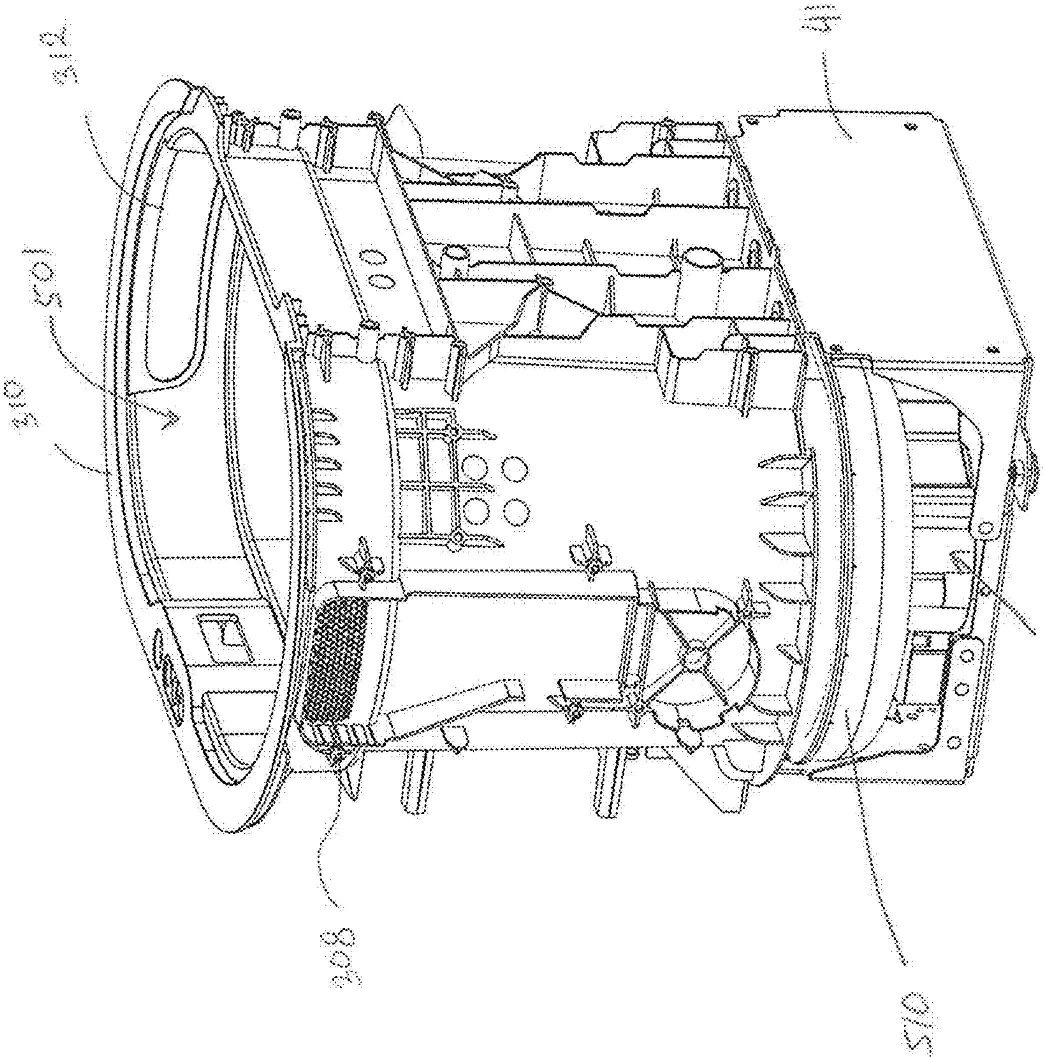


FIG. 54

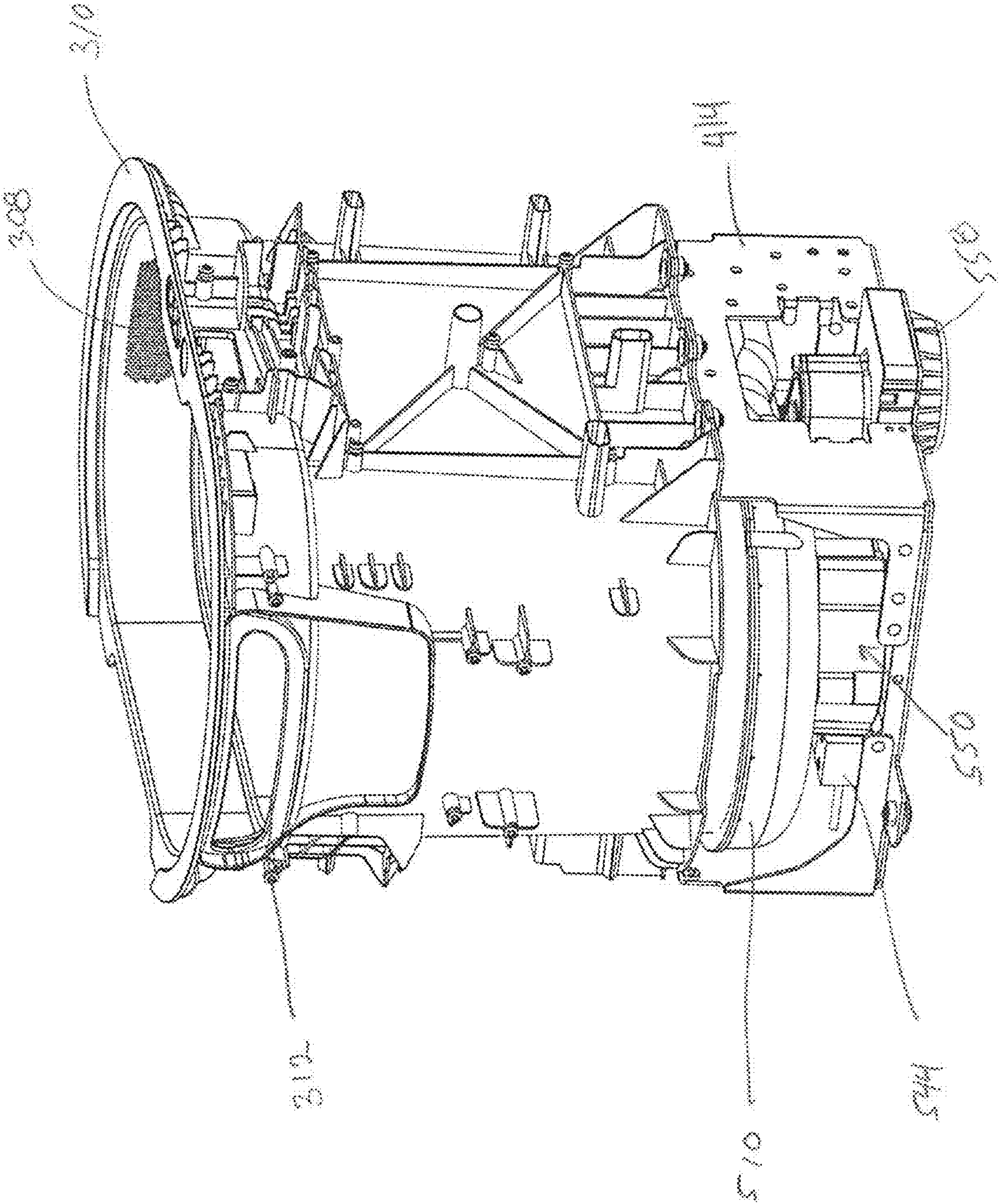


FIG. 5B

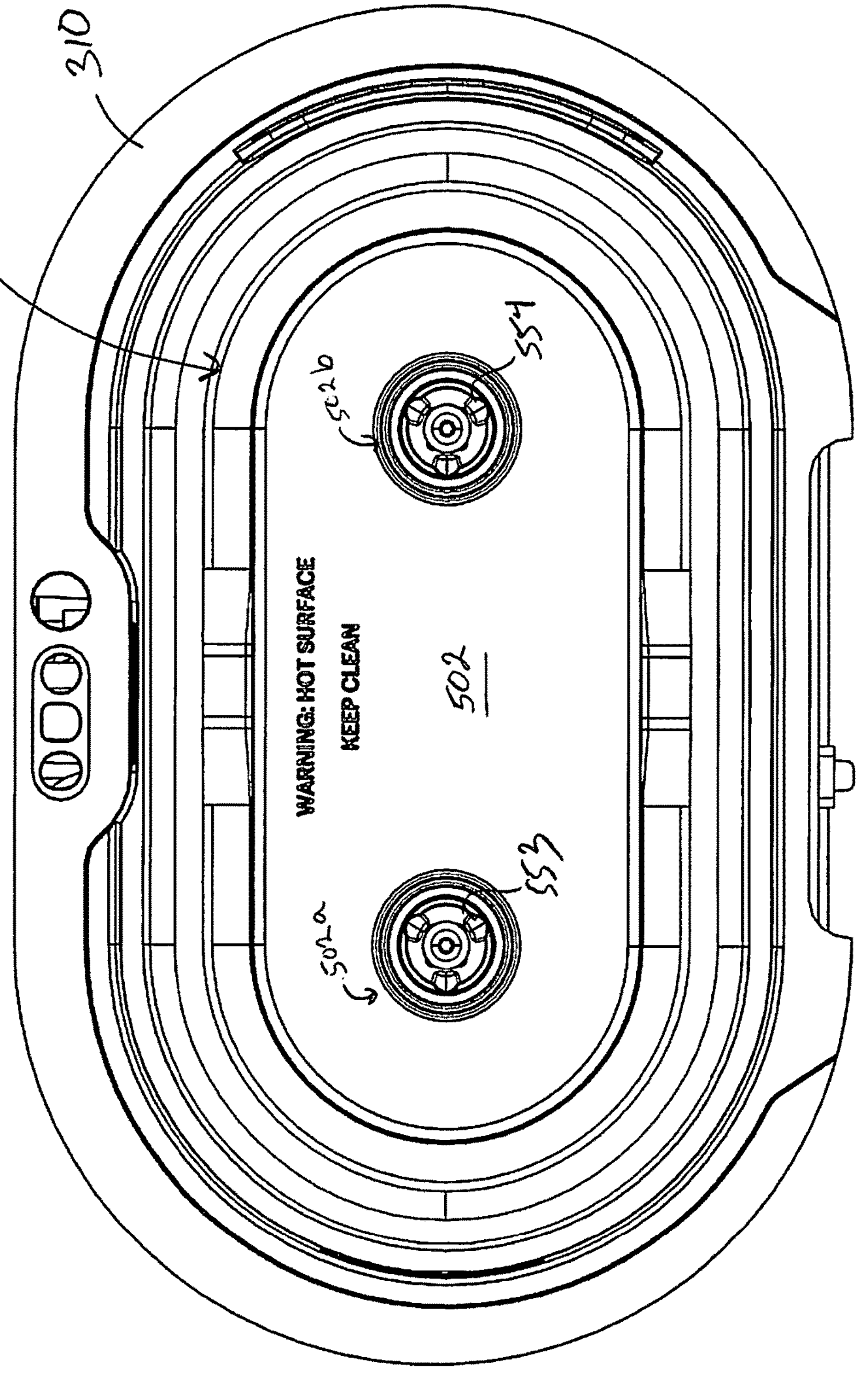


FIG. 5C

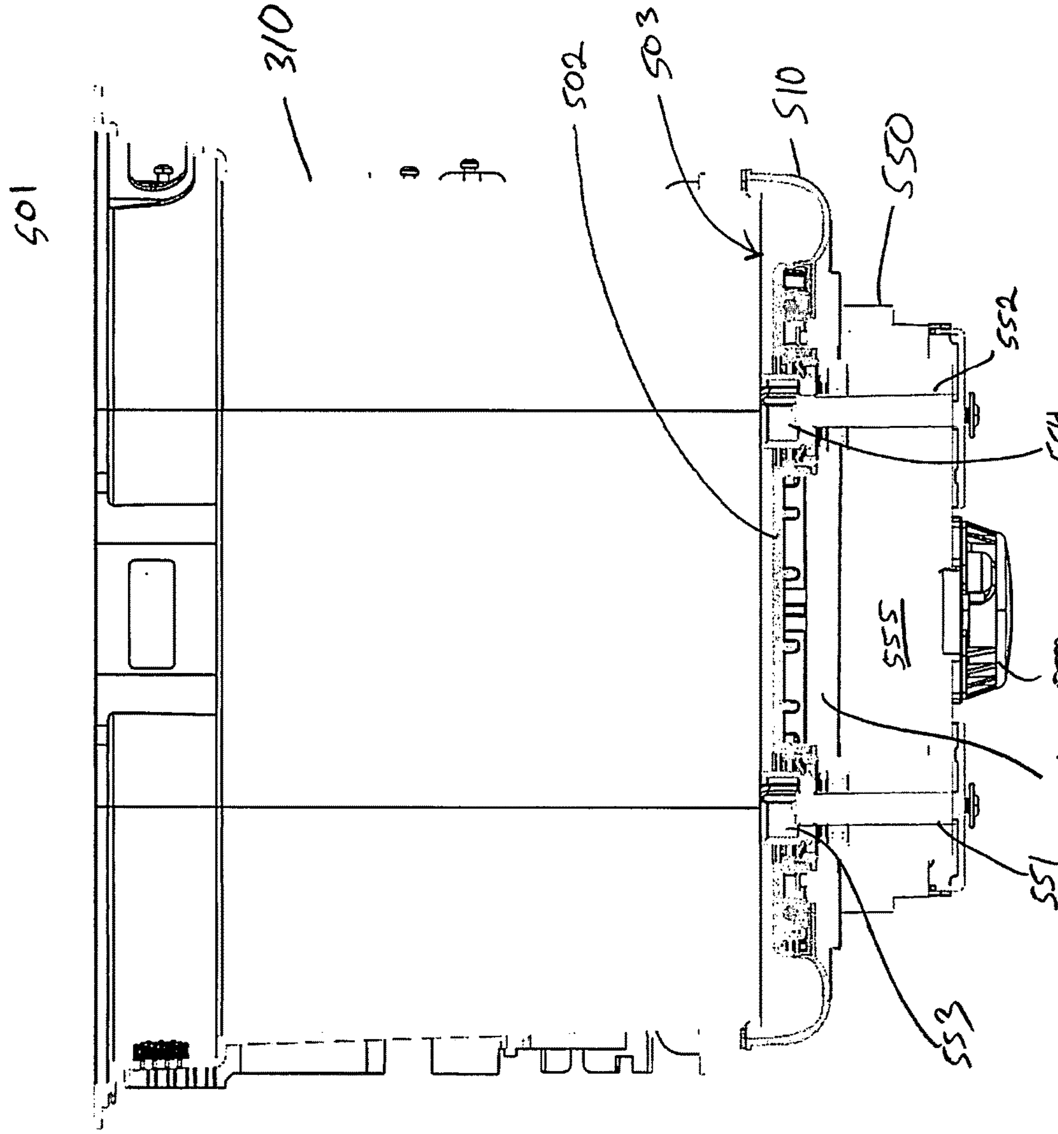


FIG. 5D

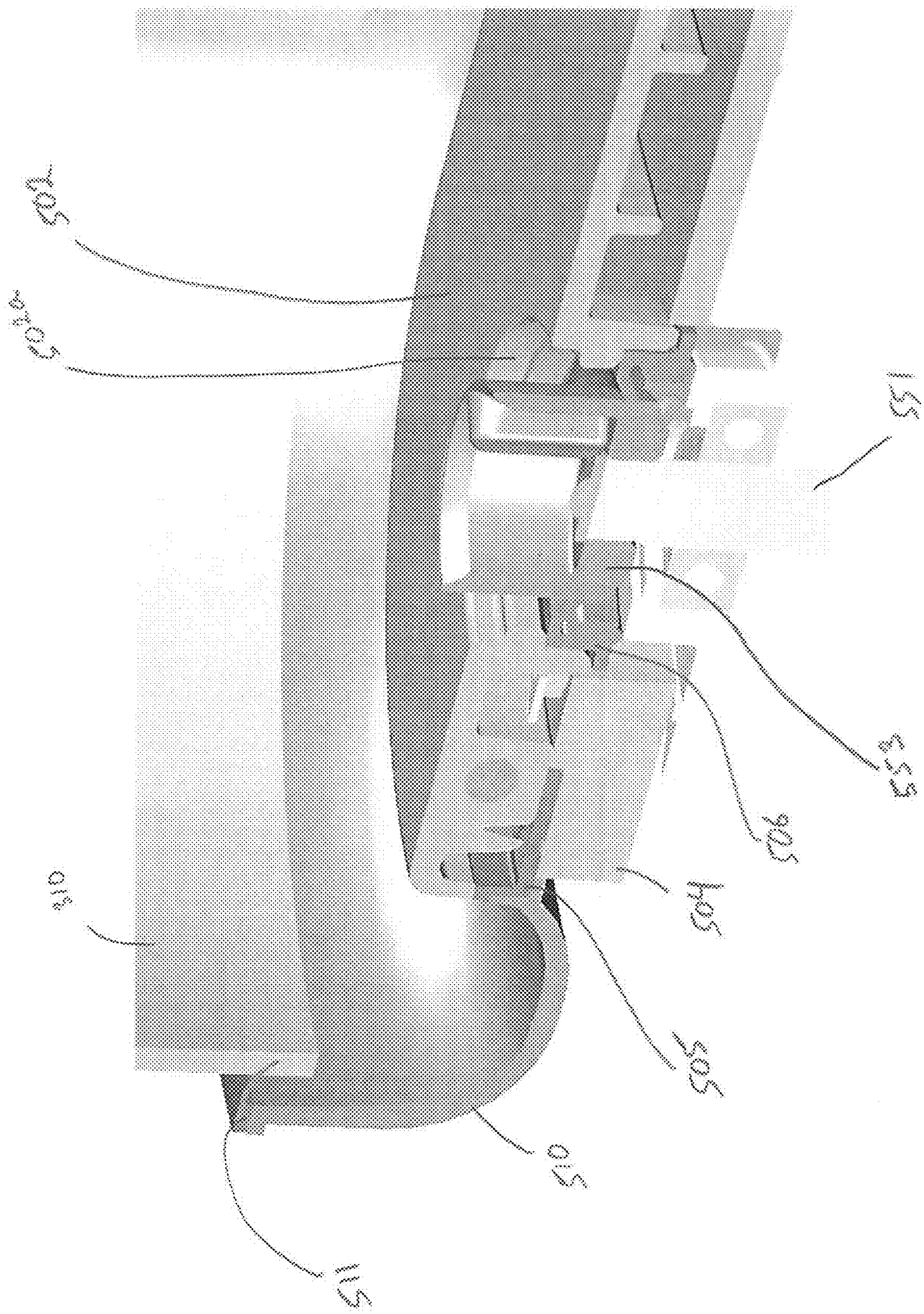


FIG. 5E

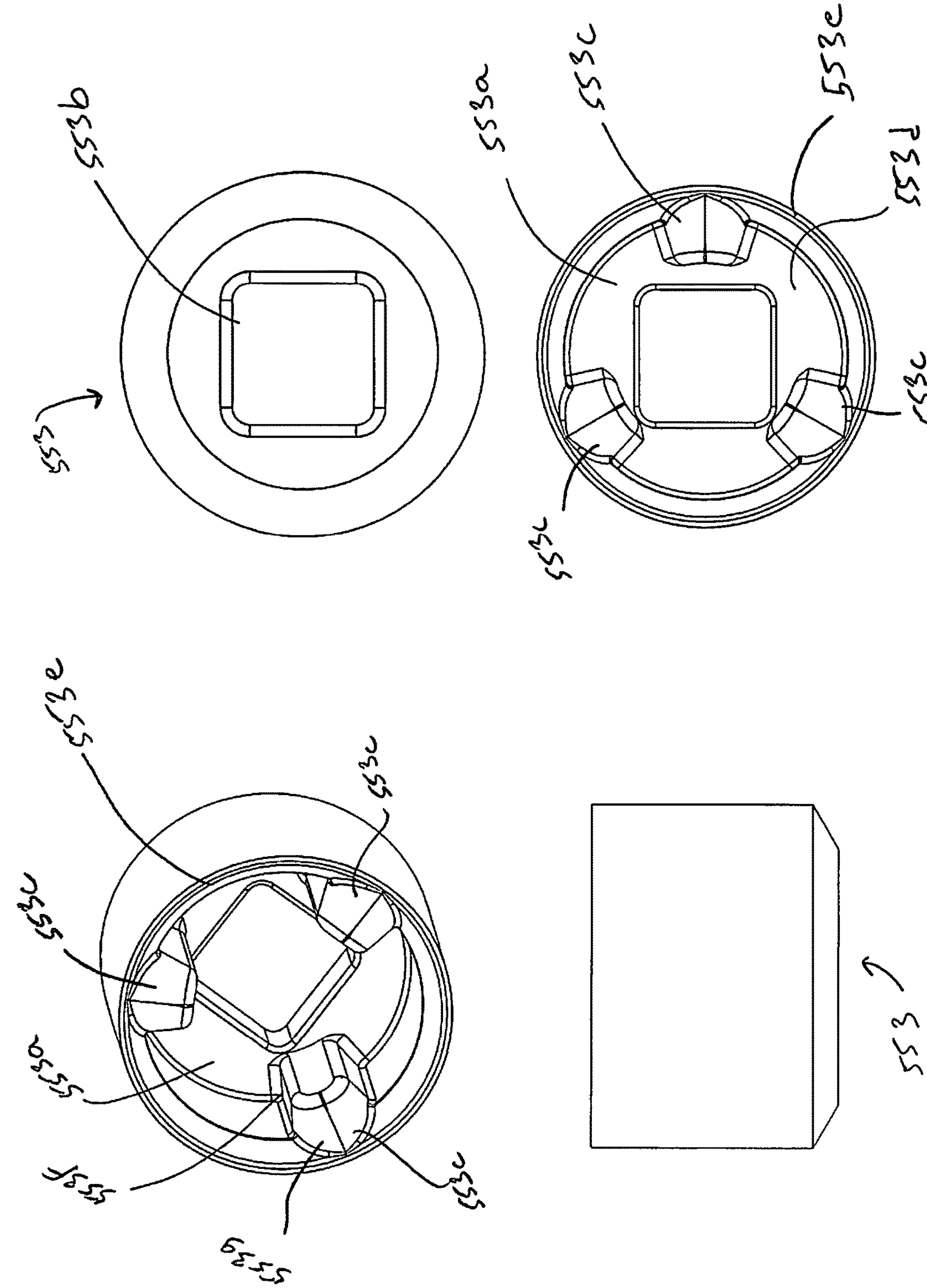

553
553b
553a
553c
553e
553d
553c
553c
553e
553c
553c
553a
553f
553g
553c
553

FIG. 5F

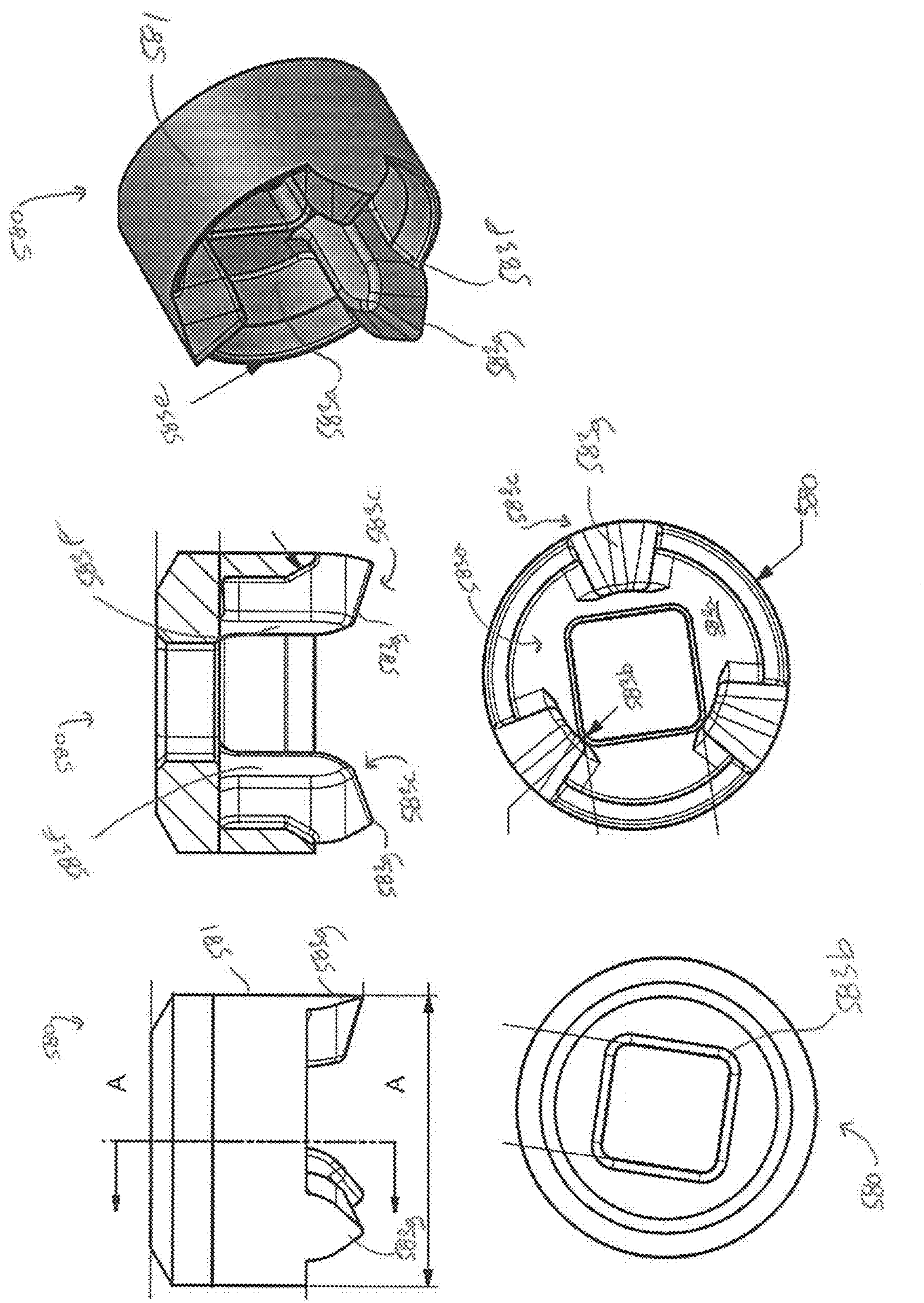


FIG. 5G

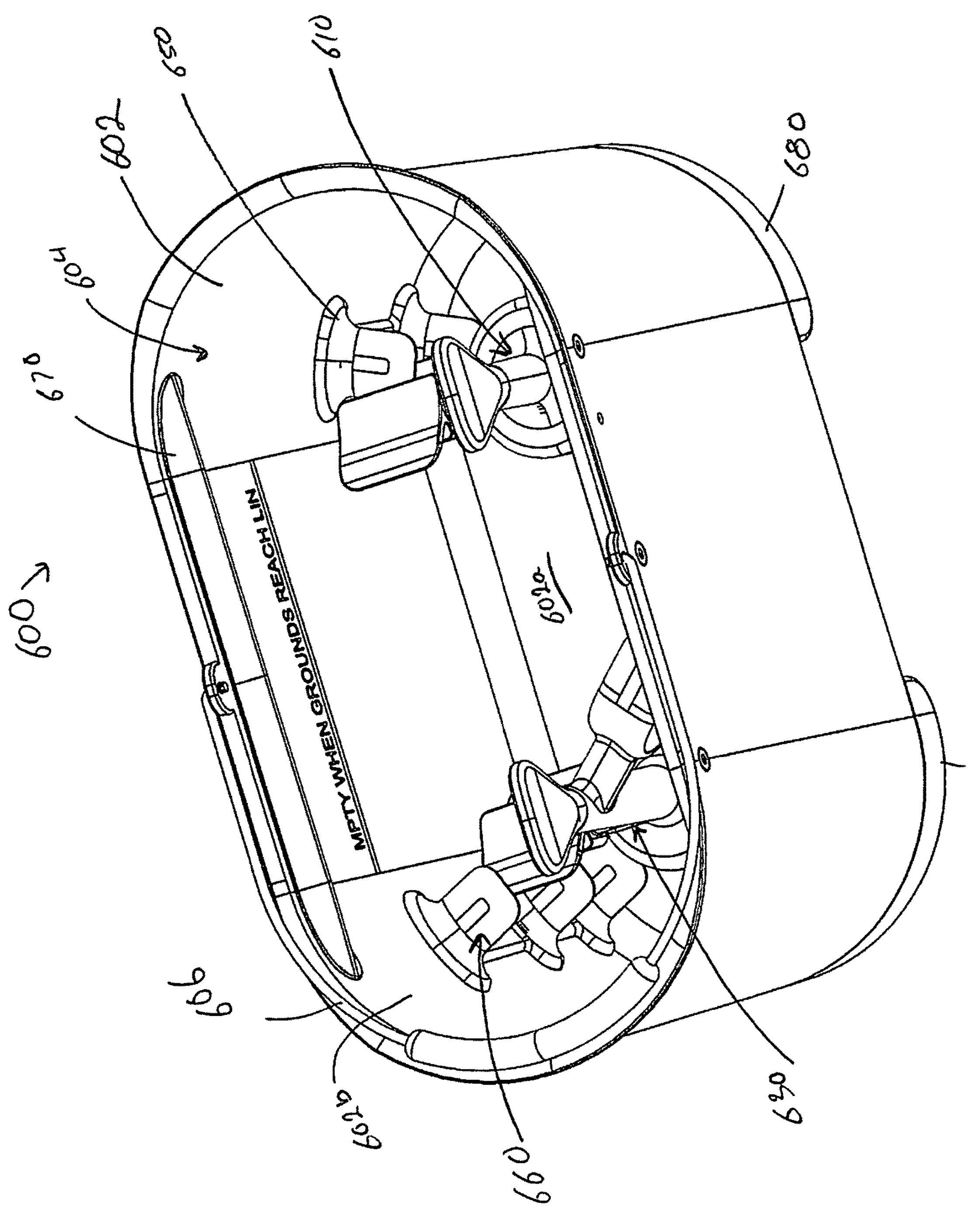

600
602
604
610
650
670
680
680
6020
MPTY WHEN GROUNDS REACH LIN
696
602b
660
690

FIG. 6A

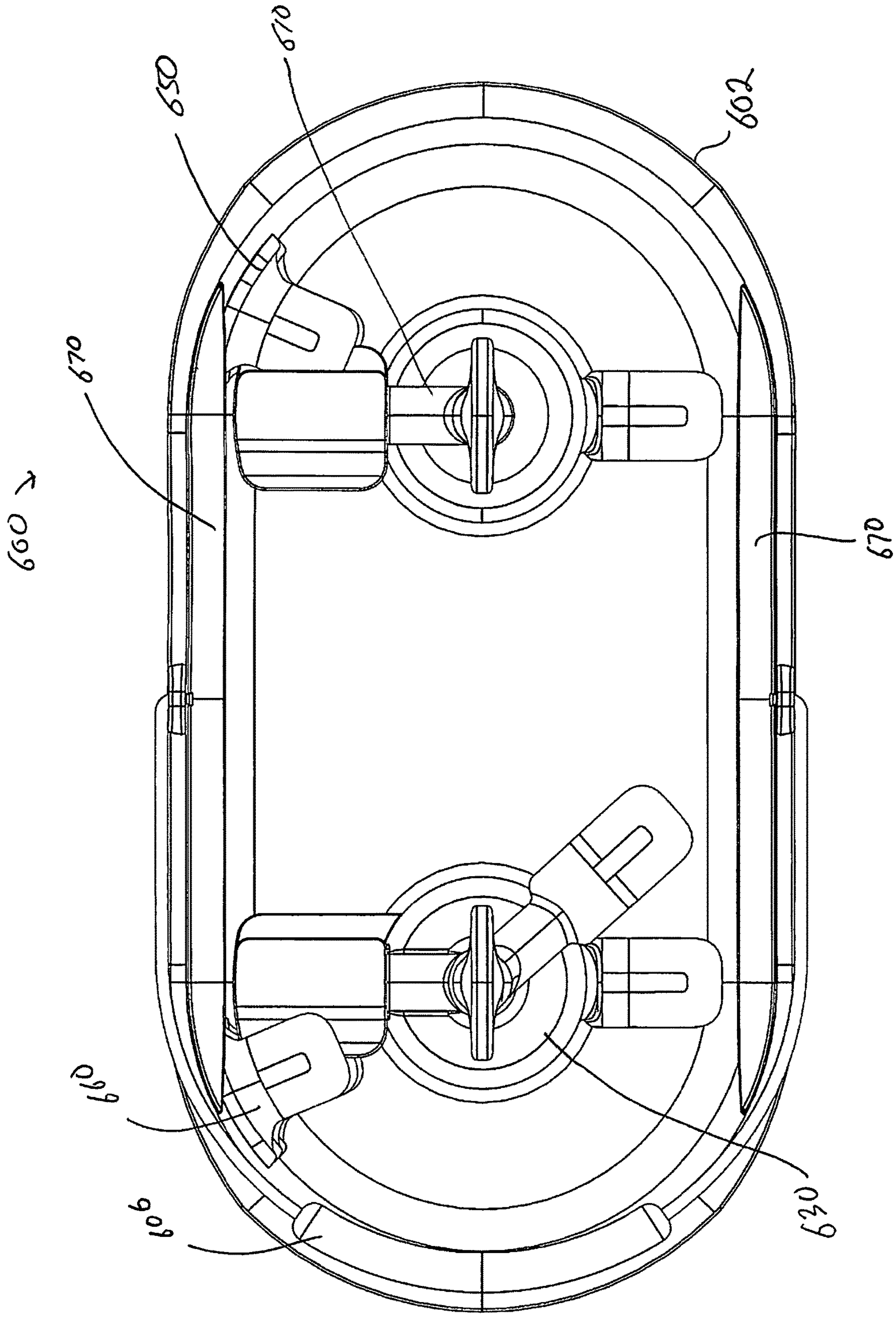


FIG 6B

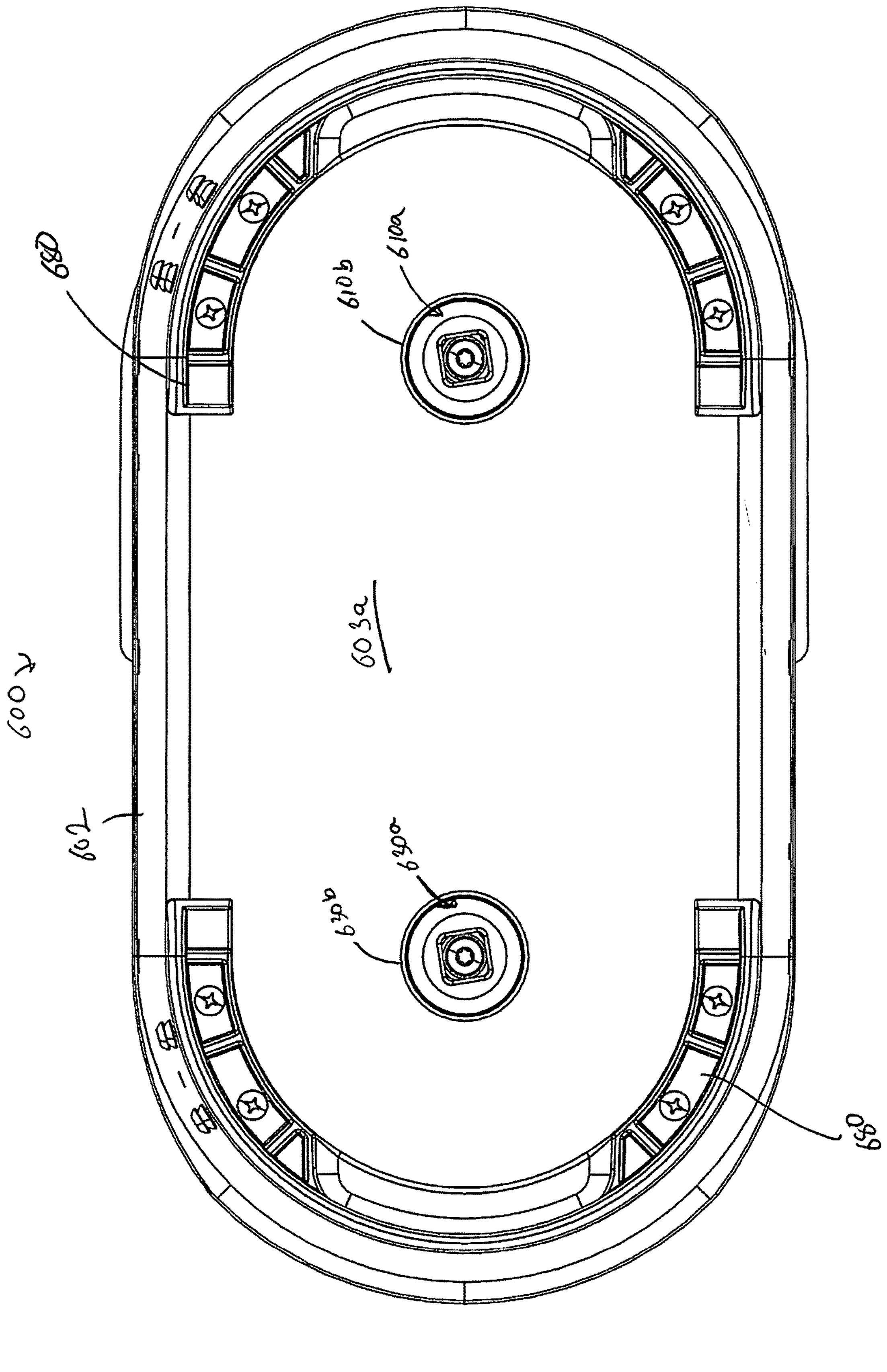
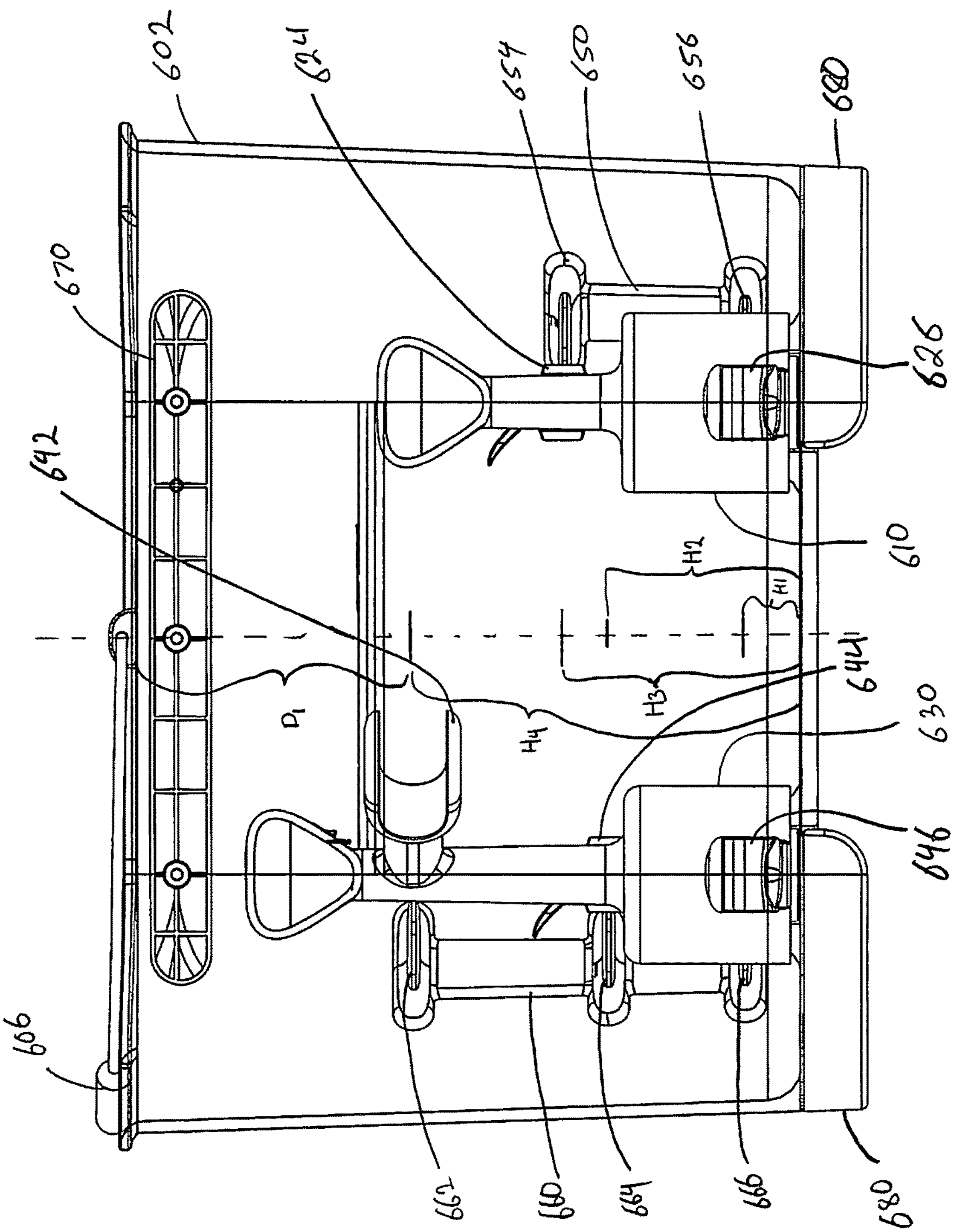


FIG. 6C



602
624
654
650
656
680
670
642
626
610
H2
H1
H3
D1
H4
644
630
646
606
662
660
664
666
680

FIG. 6D

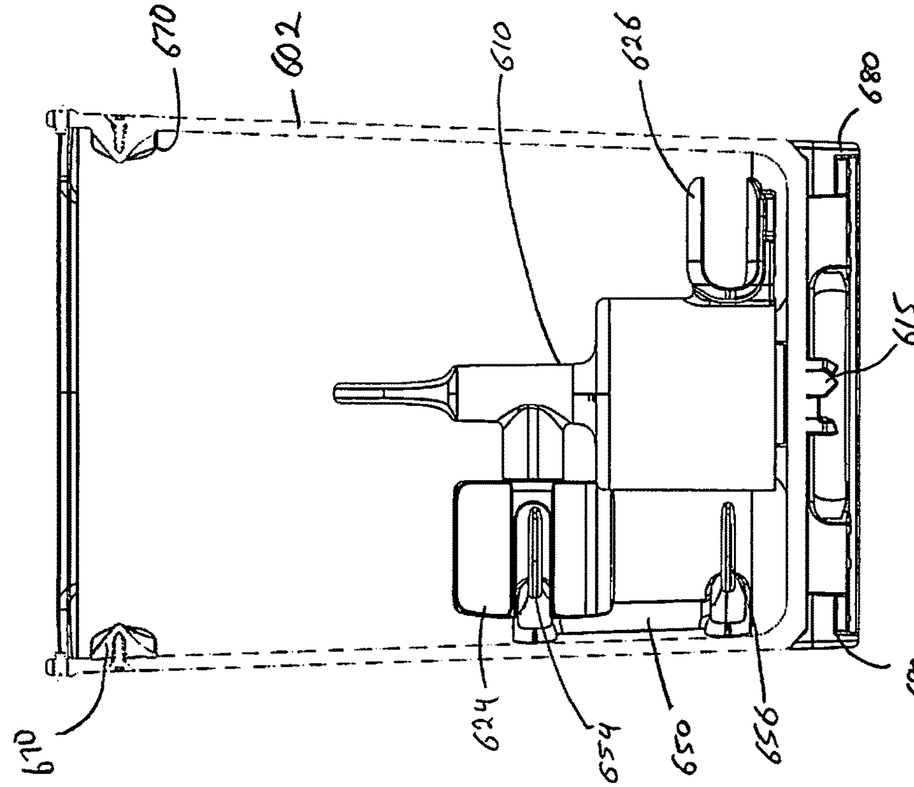

670
602
610
626
680
615
680
656
650
654
624
670

FIG. 6F

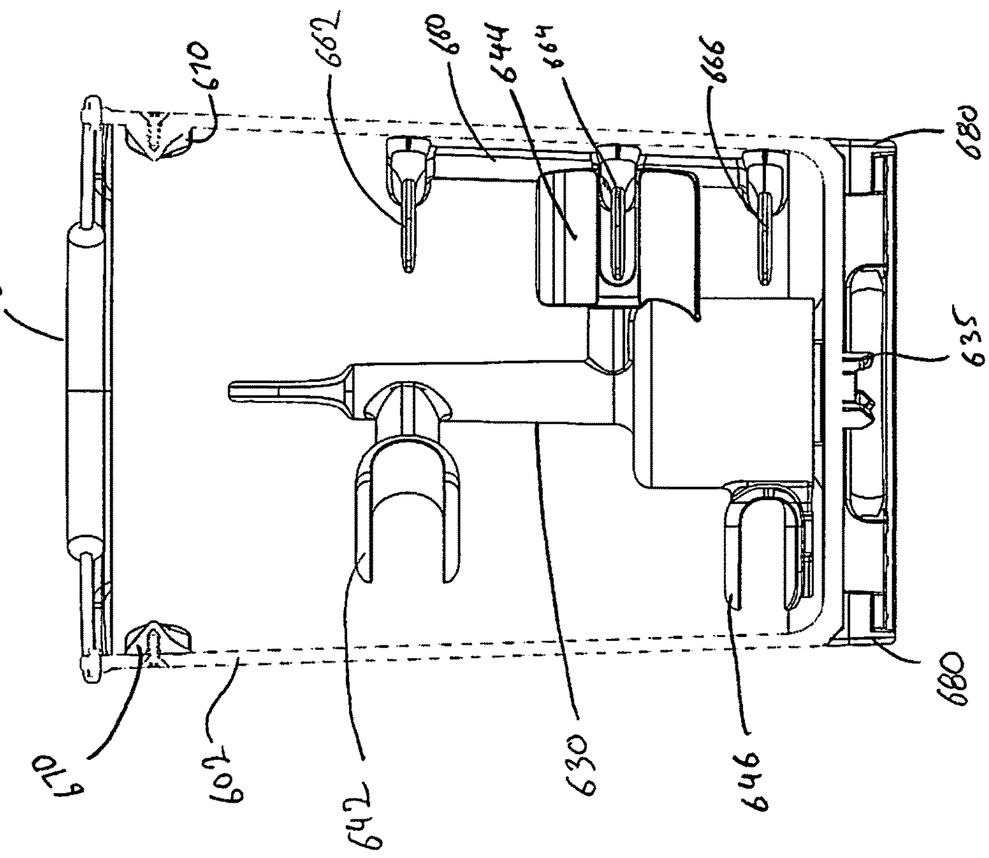

606
610
662
660
644
664
666
680
635
680
646
630
642
602
670

FIG. 6E

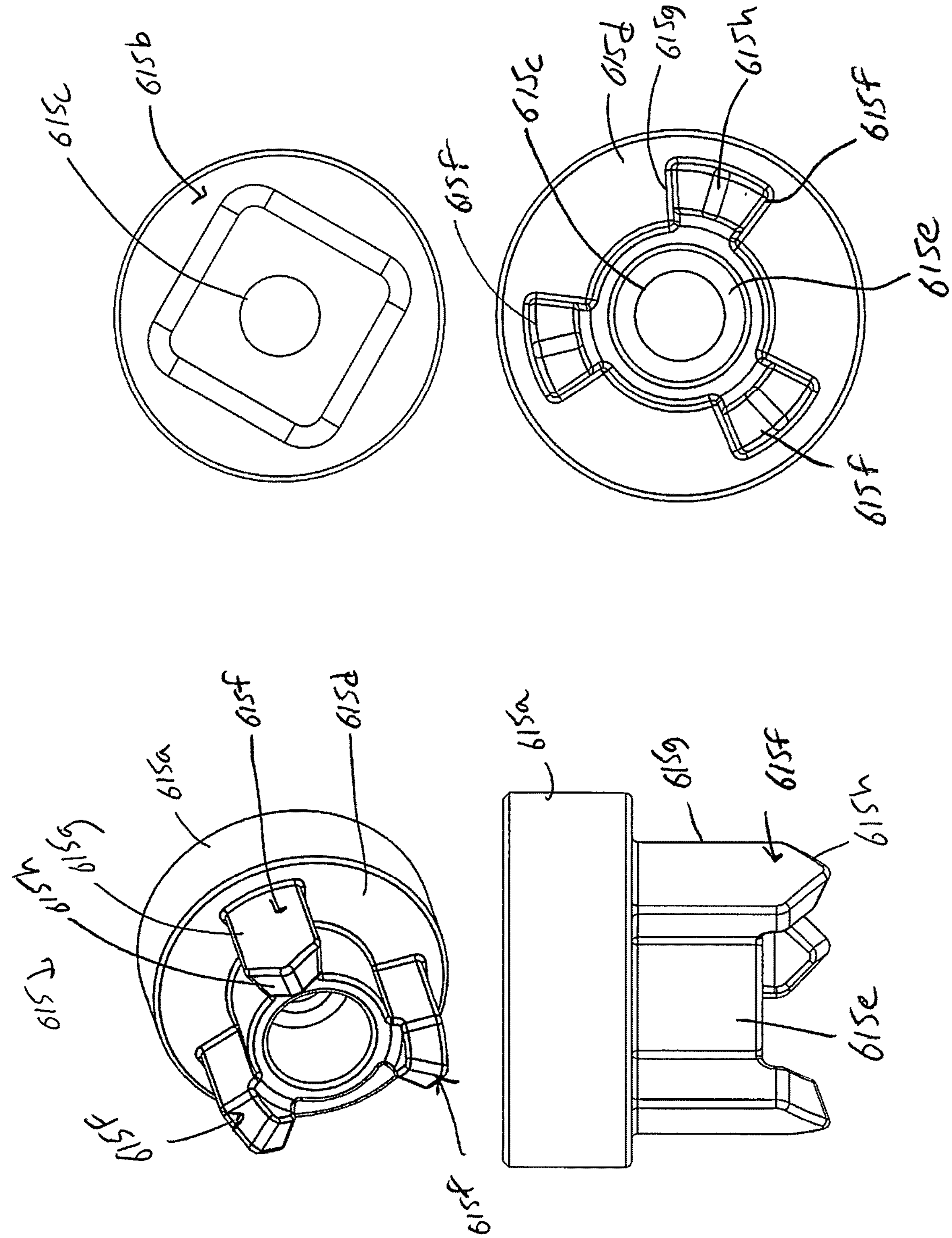


FIG. 6G

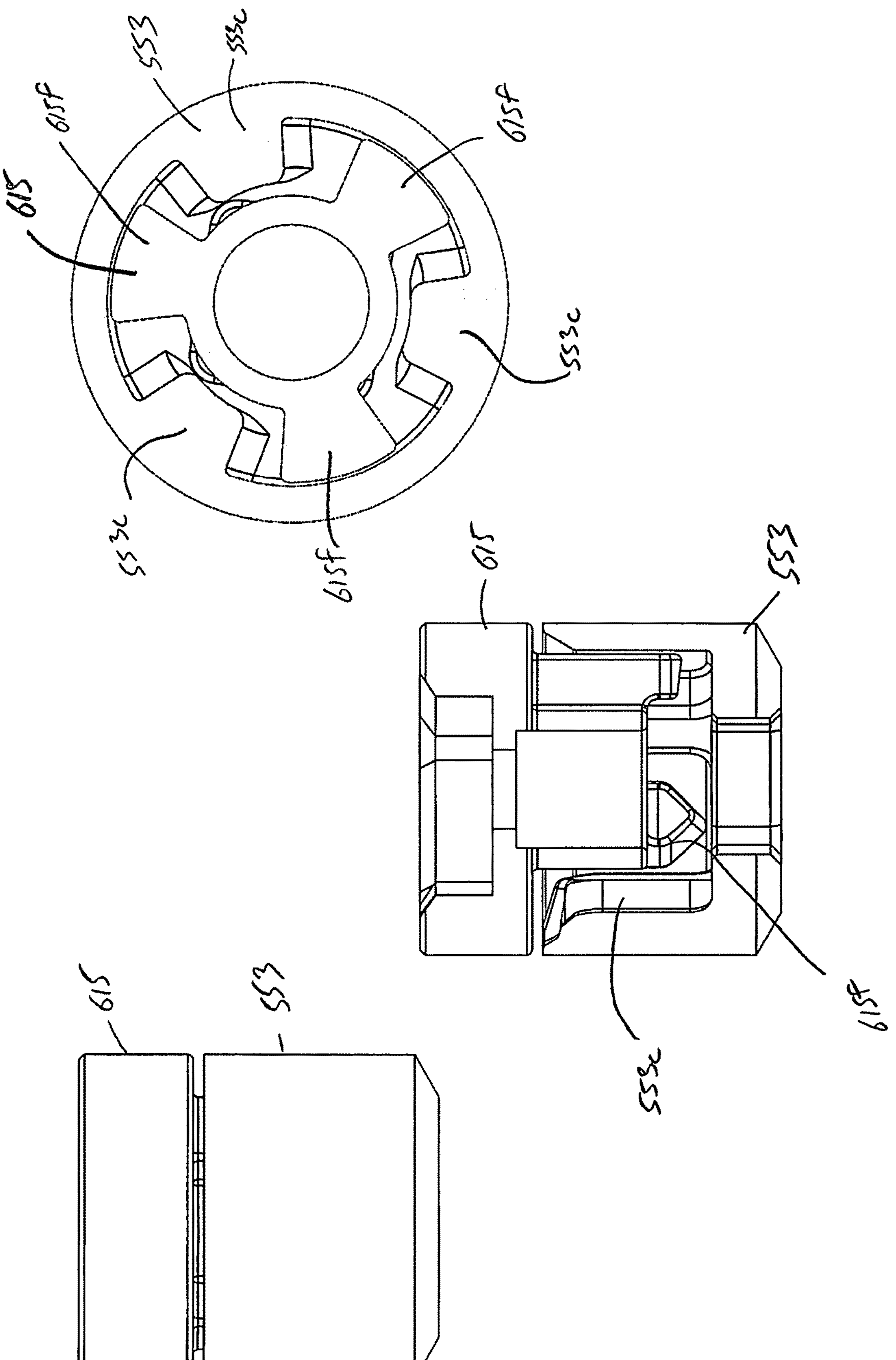

553
553c
615
615f
615f
553c
553c
615f
615
553
615f
553c
615
553

FIG. 6M

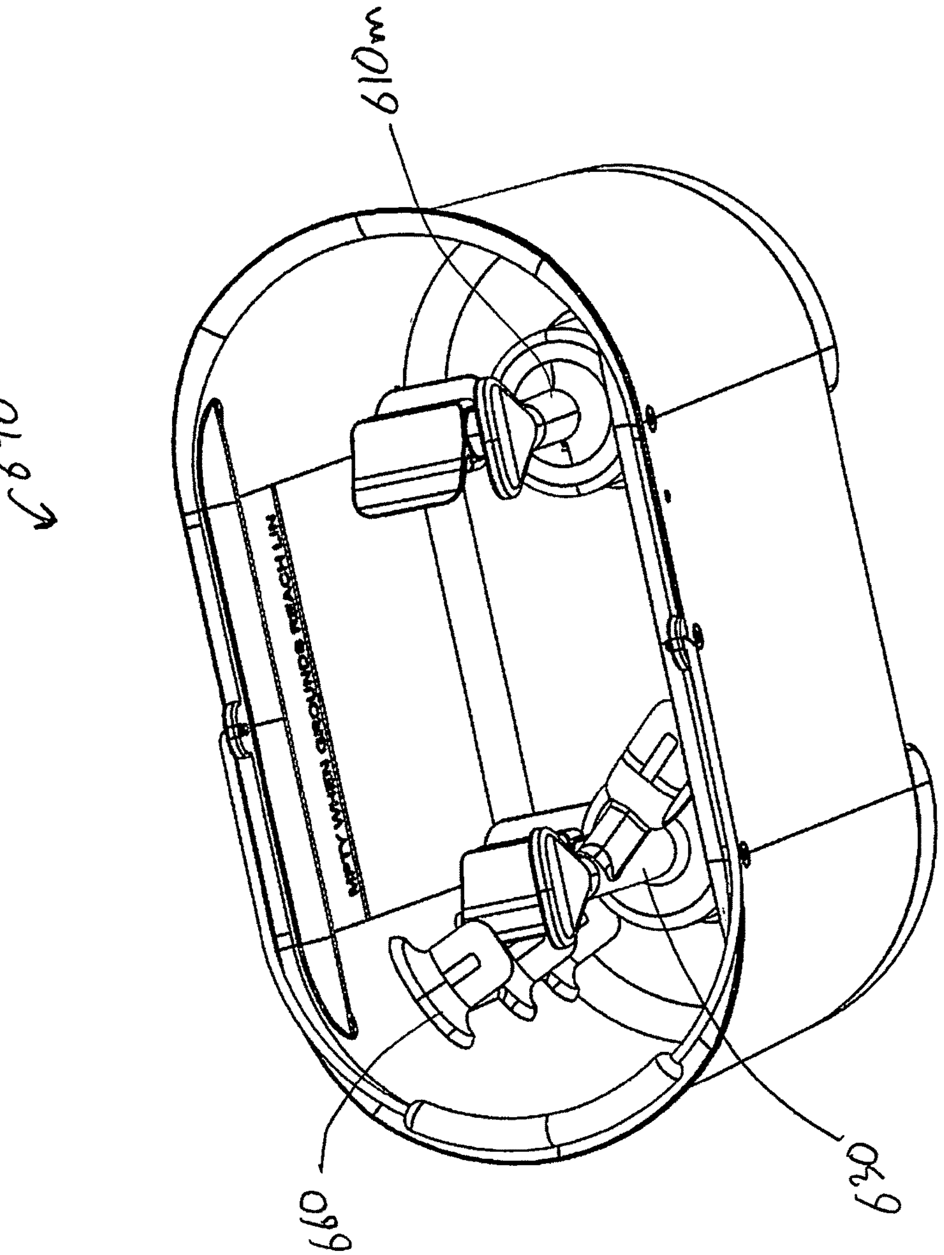
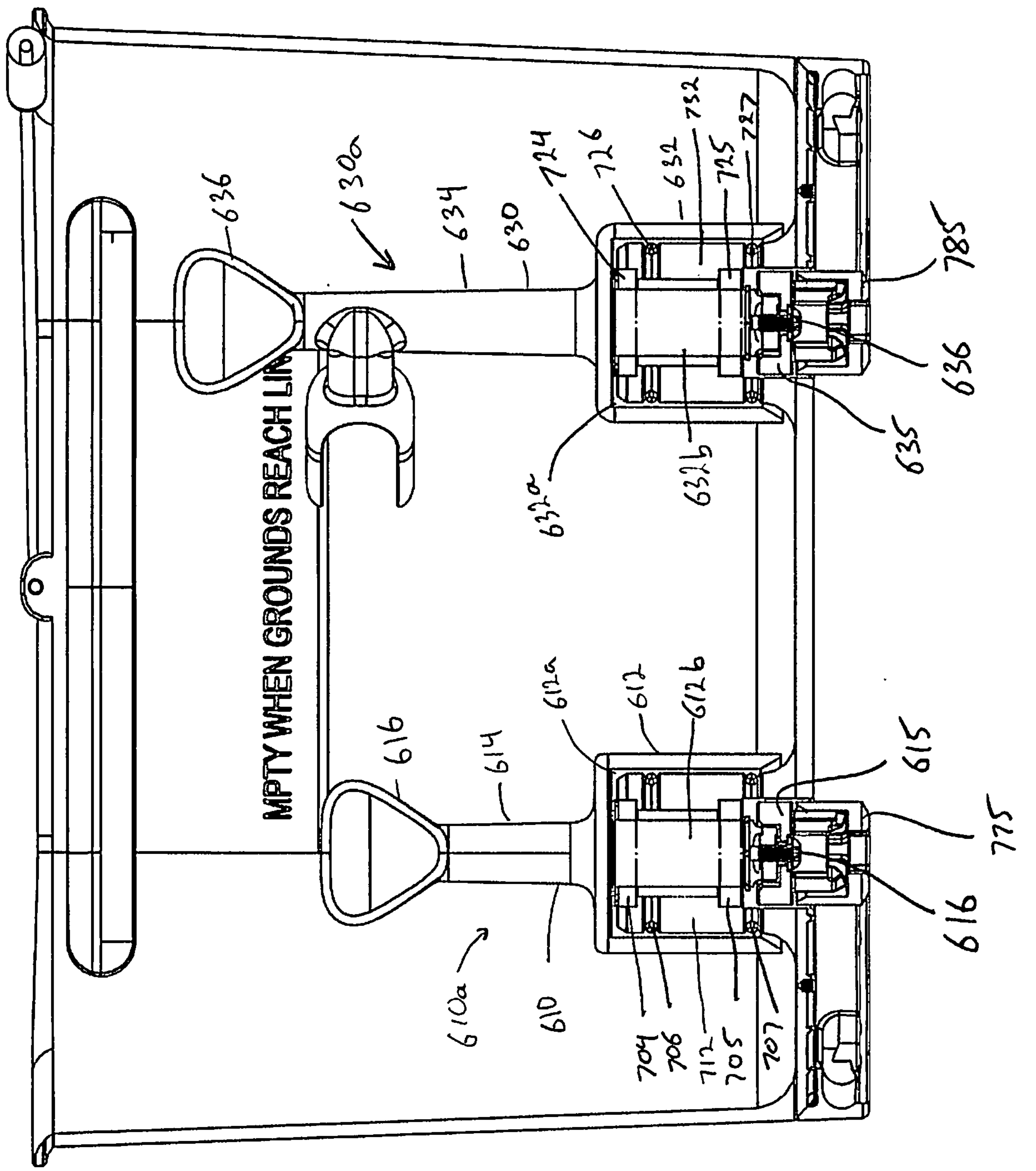


FIG. 6I

FIG. 7


MPTY WHEN GROUNDS REACH LI
636
630a
634
630
724
726
632
732
725
727
785
636
635
632b
632a
616
614
612a
612
612b
615
775
616
610a
610
704
706
712
705
707

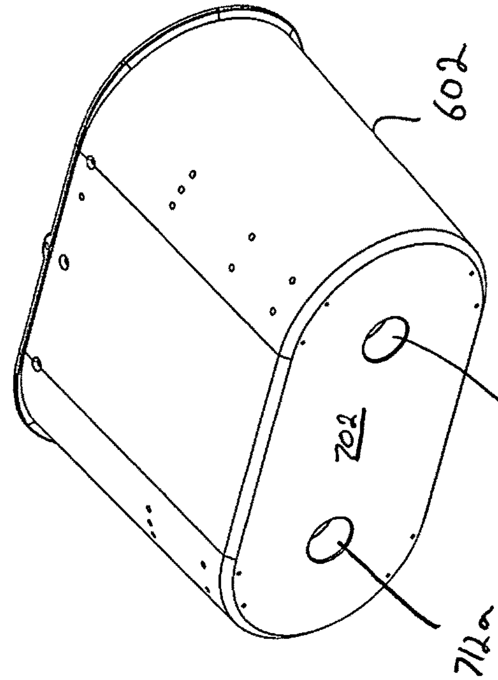


FIG. 7B

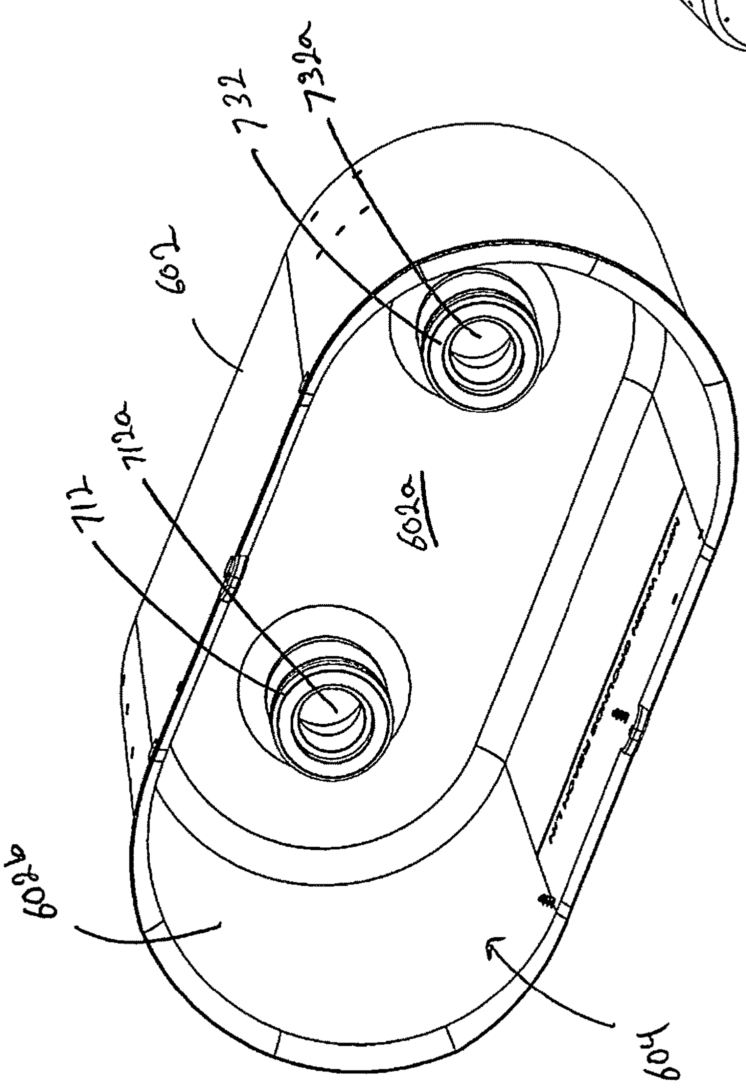


FIG. 7A

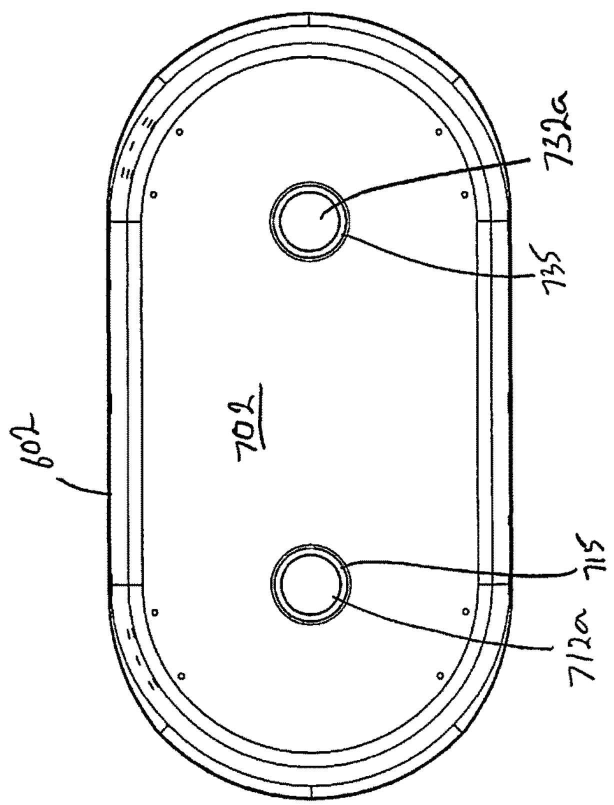


FIG. 7D

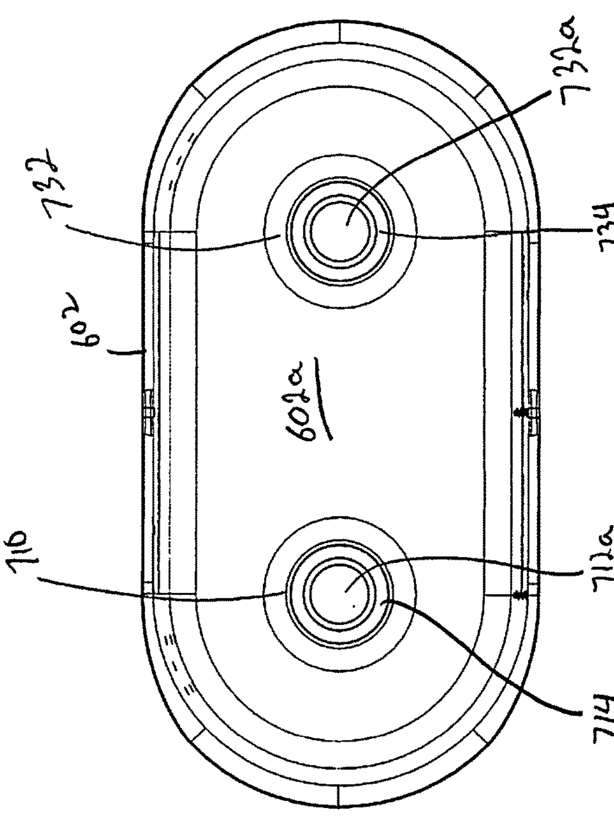


FIG. 7C

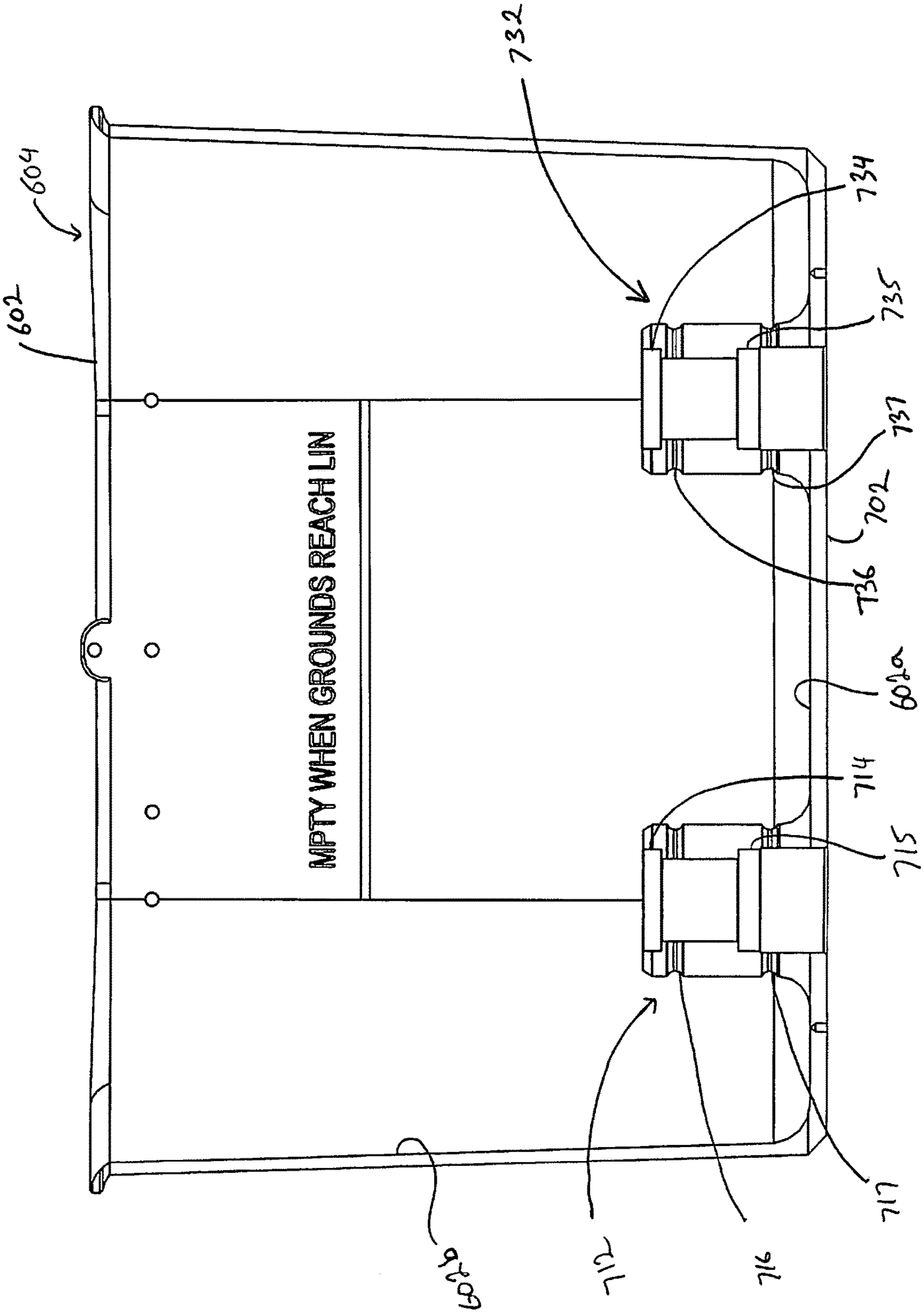

602
604
732
734
735
737
702
736
602a
714
715
717
716
712
602b
MPTY WHEN GROUNDS REACH LIN

FIG. 7E

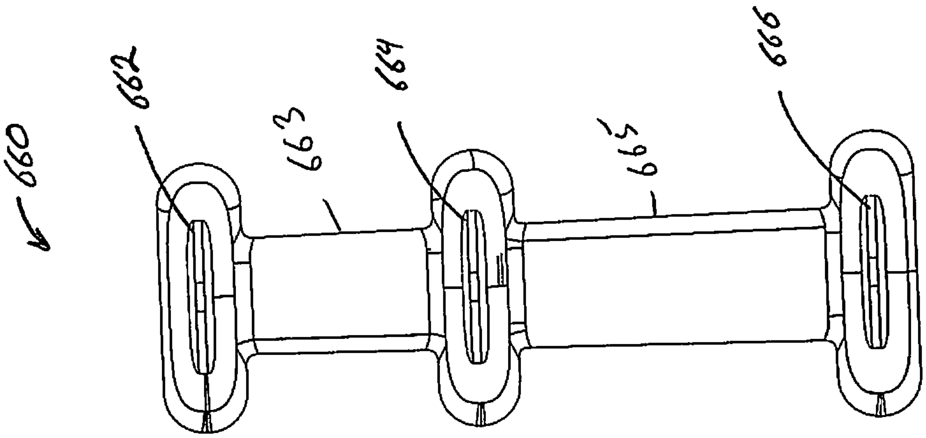


FIG. 7G

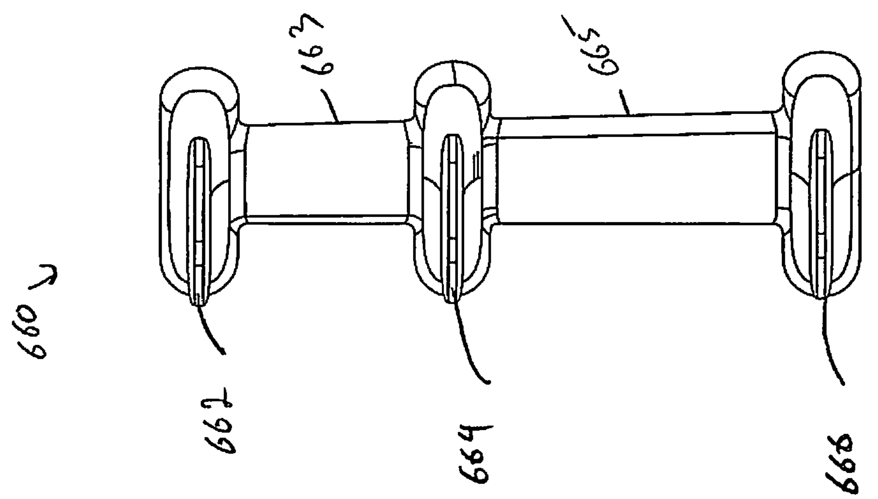


FIG. 7F

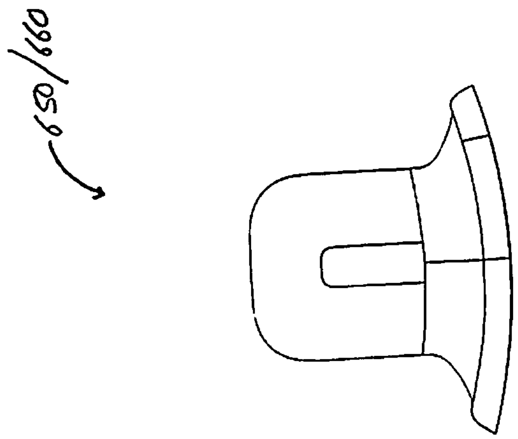


FIG. 7J

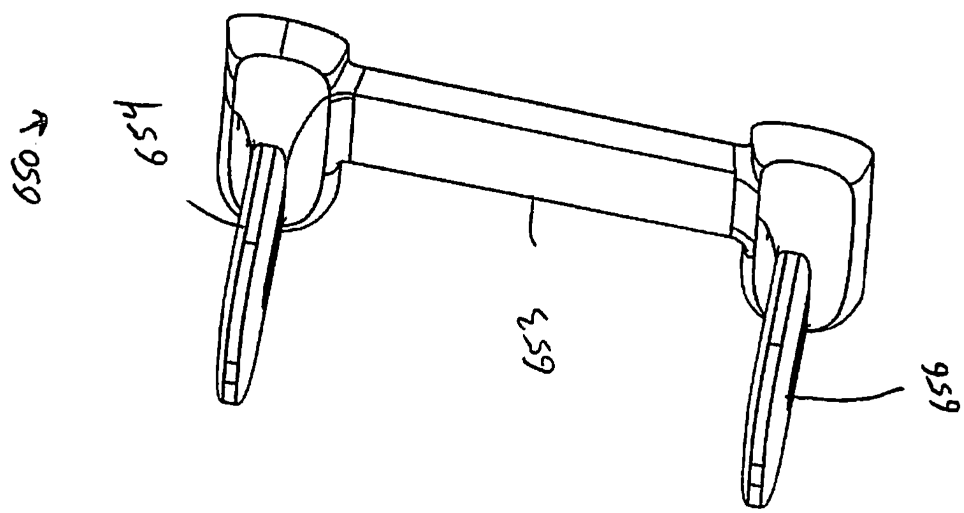


FIG. 7I

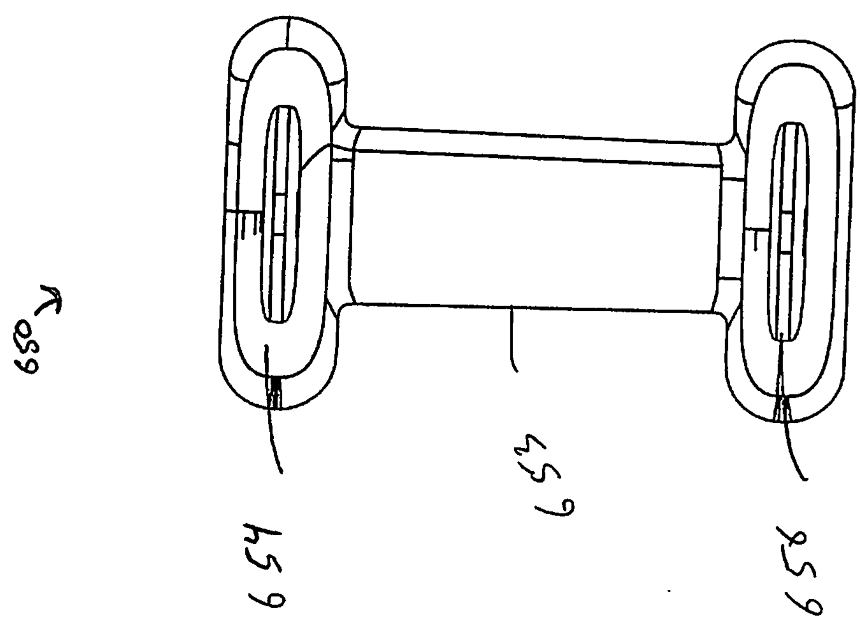
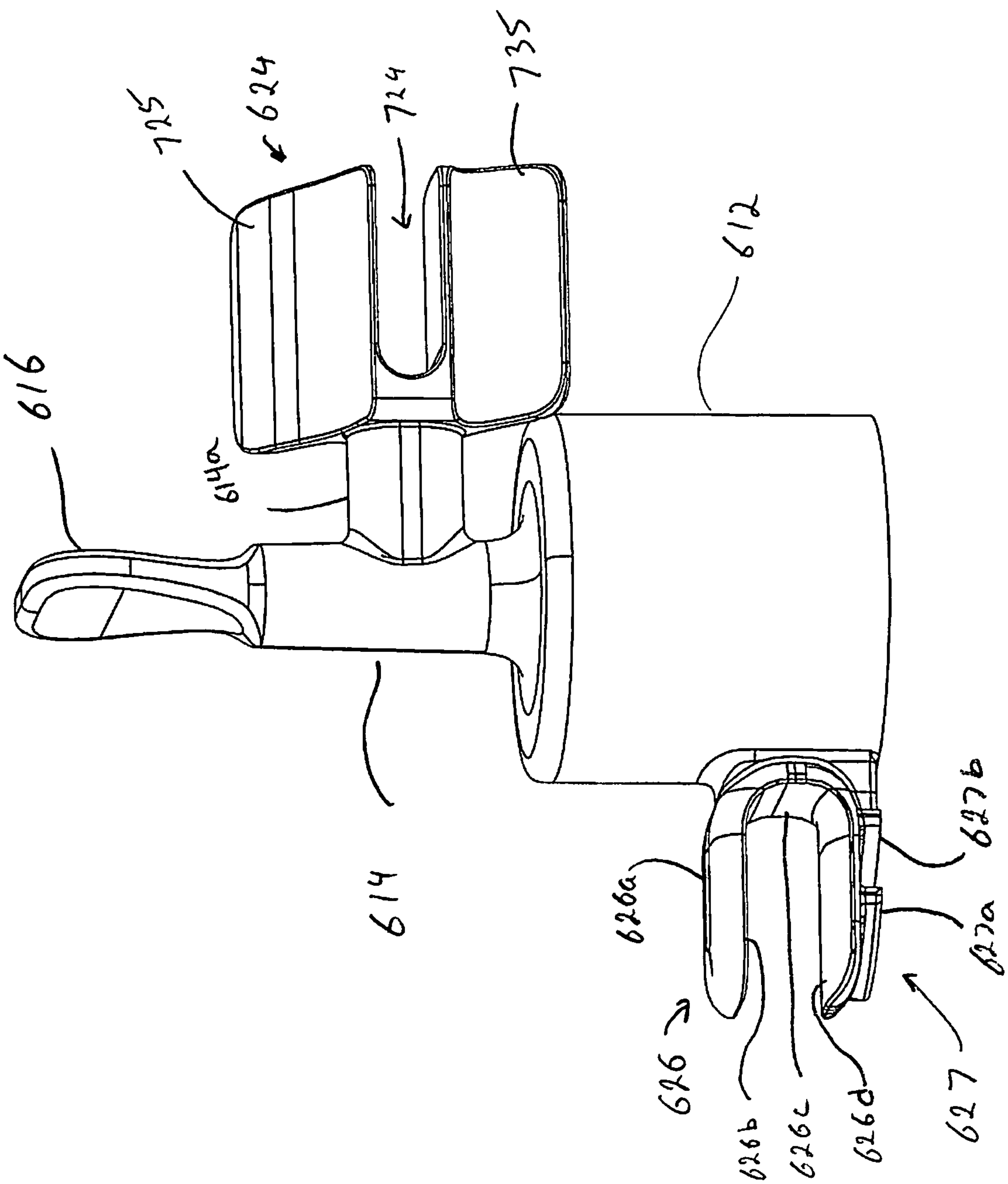


FIG. 7H



616
725
624
724
735
612
614a
614
626a
626
626b
626c
626d
627
627a
627b

FIG. 8A

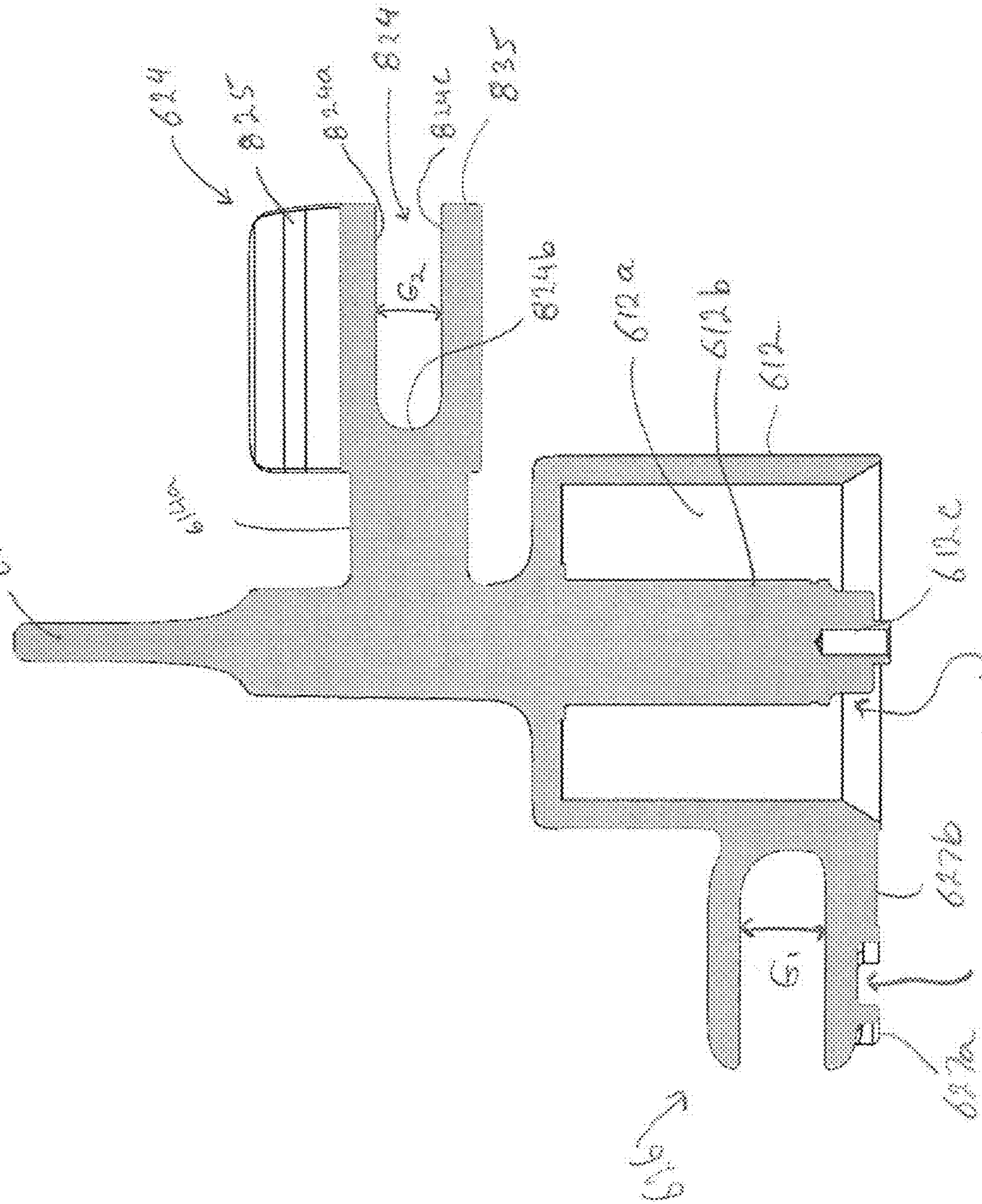

624
825
824a
824
824c
835
824b
612a
612b
612
612c
616
627b
627c
627a

FIG. 83

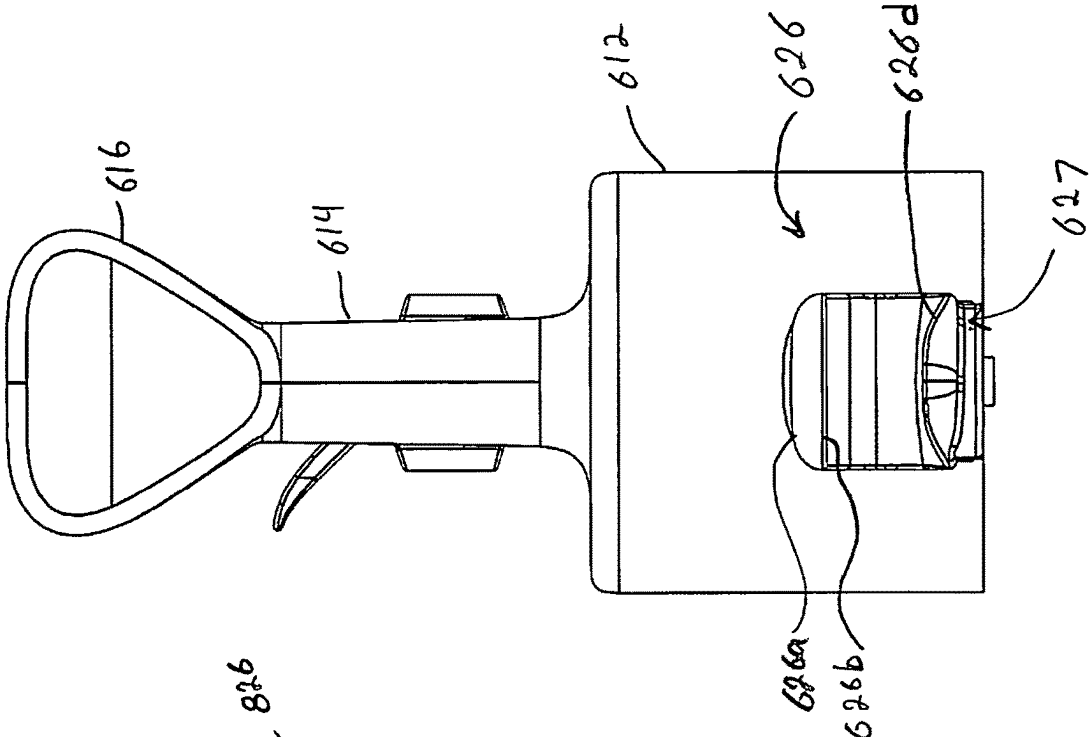

616
614
612
626
626d
627
626a
626b

FIG. 8D

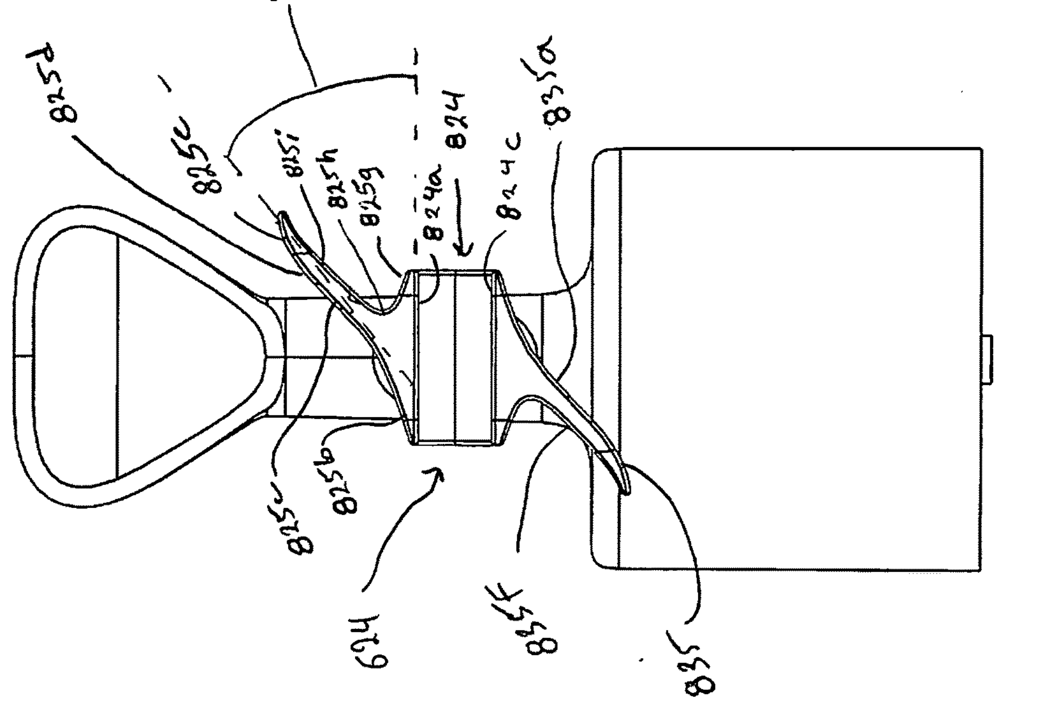

825d
825e
825i
825h
825g
824a
824
824c
835a
Angle 826
825c
825b
624
835f
835

FIG. 8C

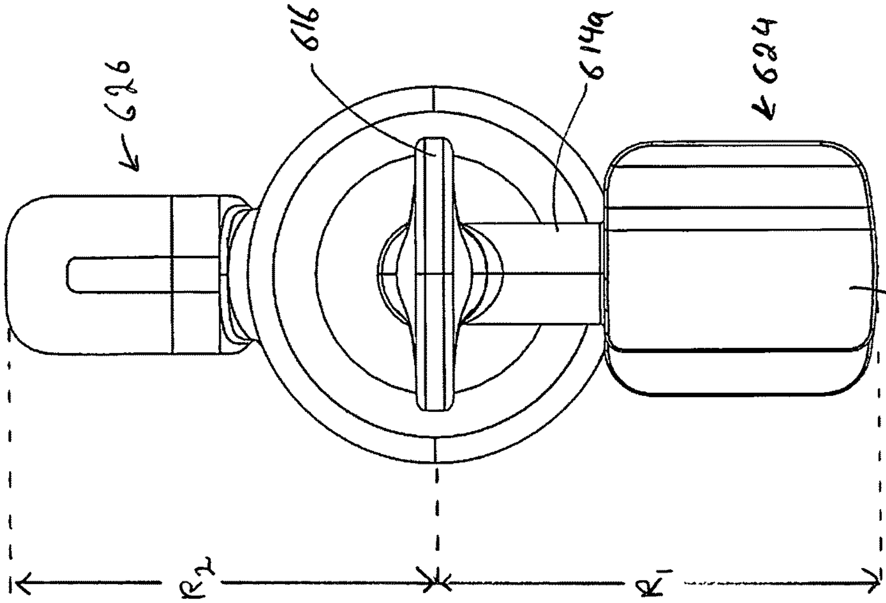


FIG. 8F

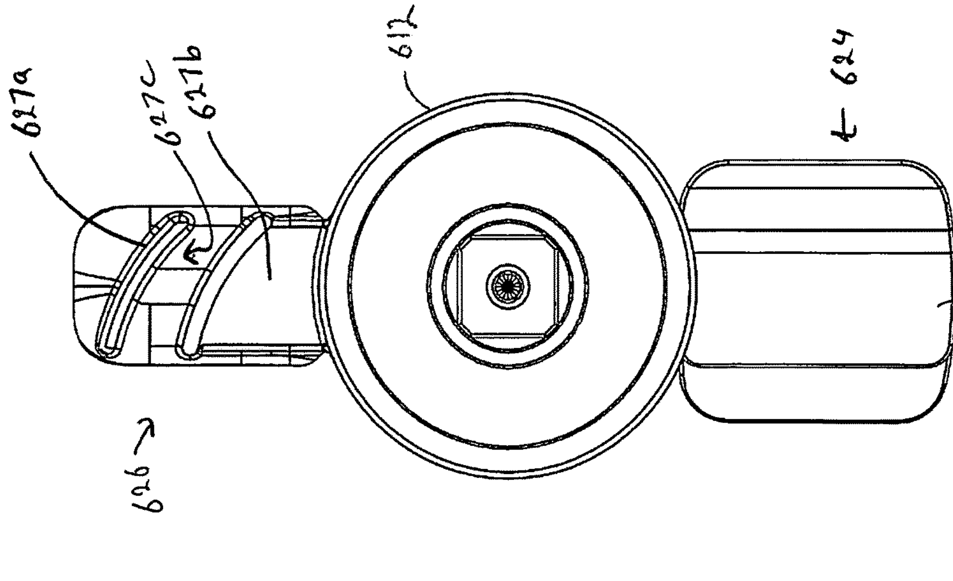


FIG. 8E

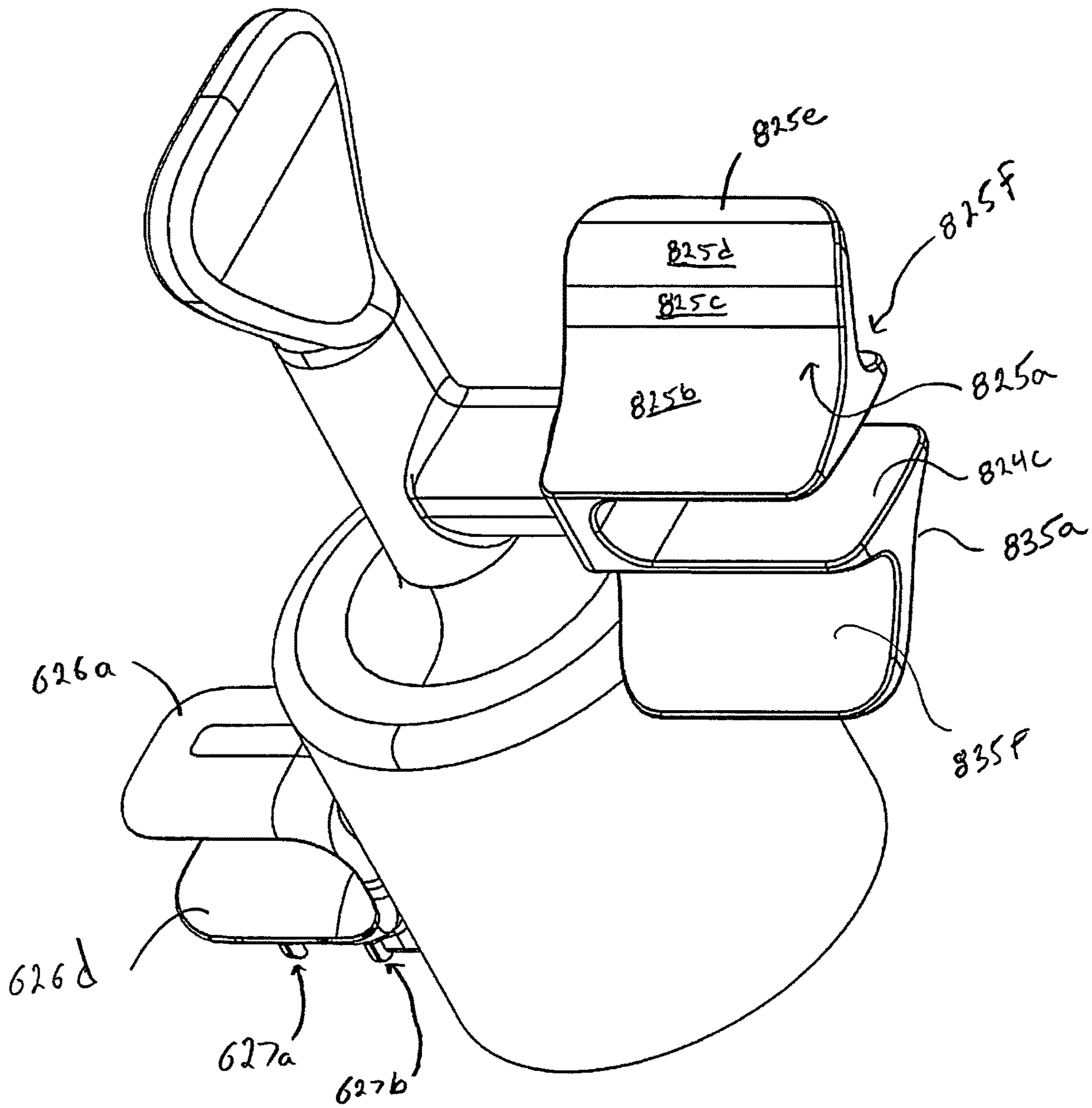

825e
825f
825d
825c
825a
825b
824c
835a
835f
626a
626d
627a
627b

FIG. 8G

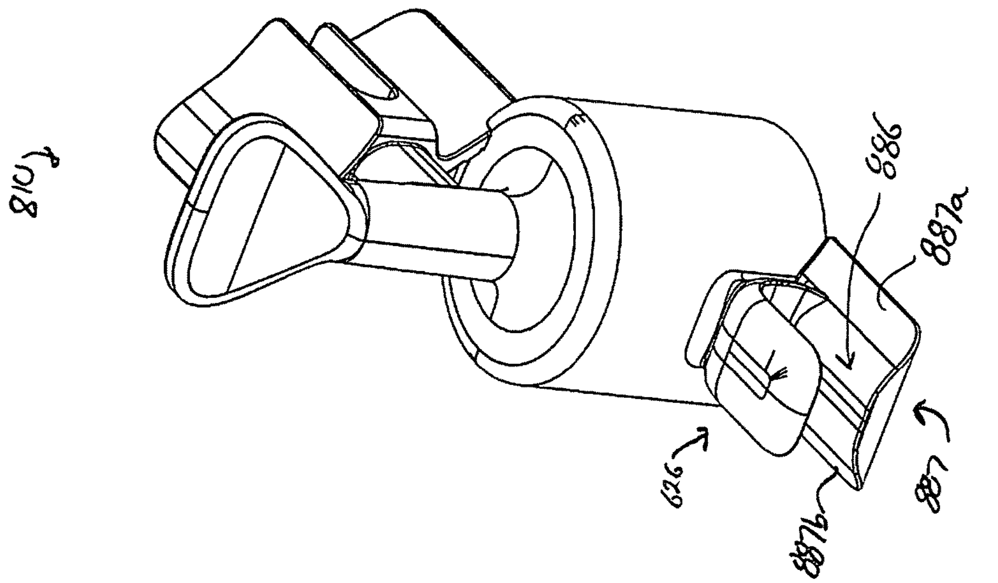


FIG. 8J

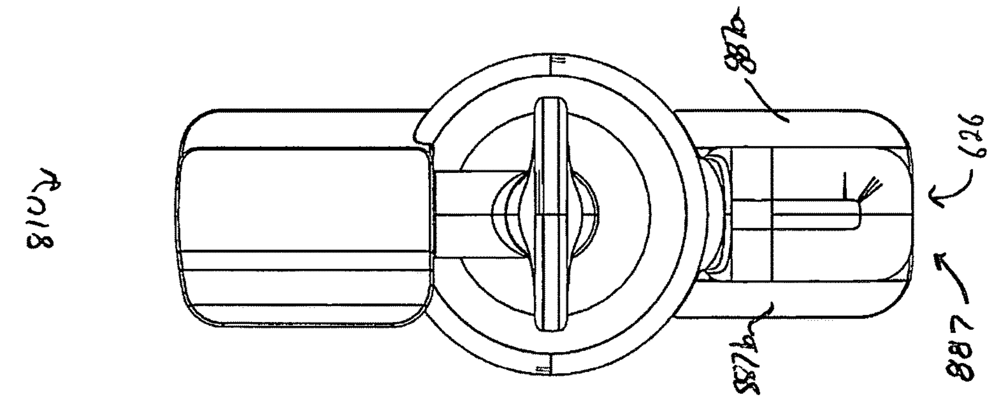


FIG. 8I

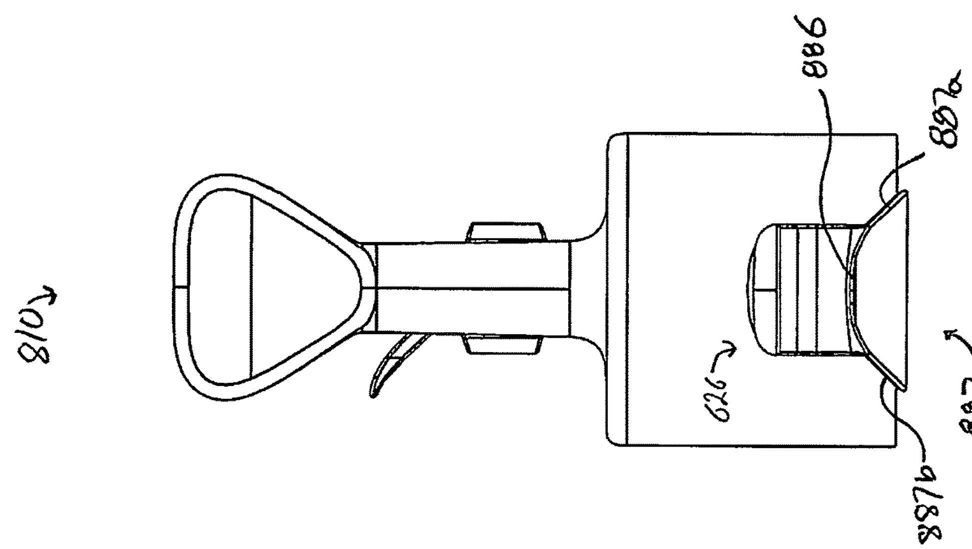


FIG. 8H

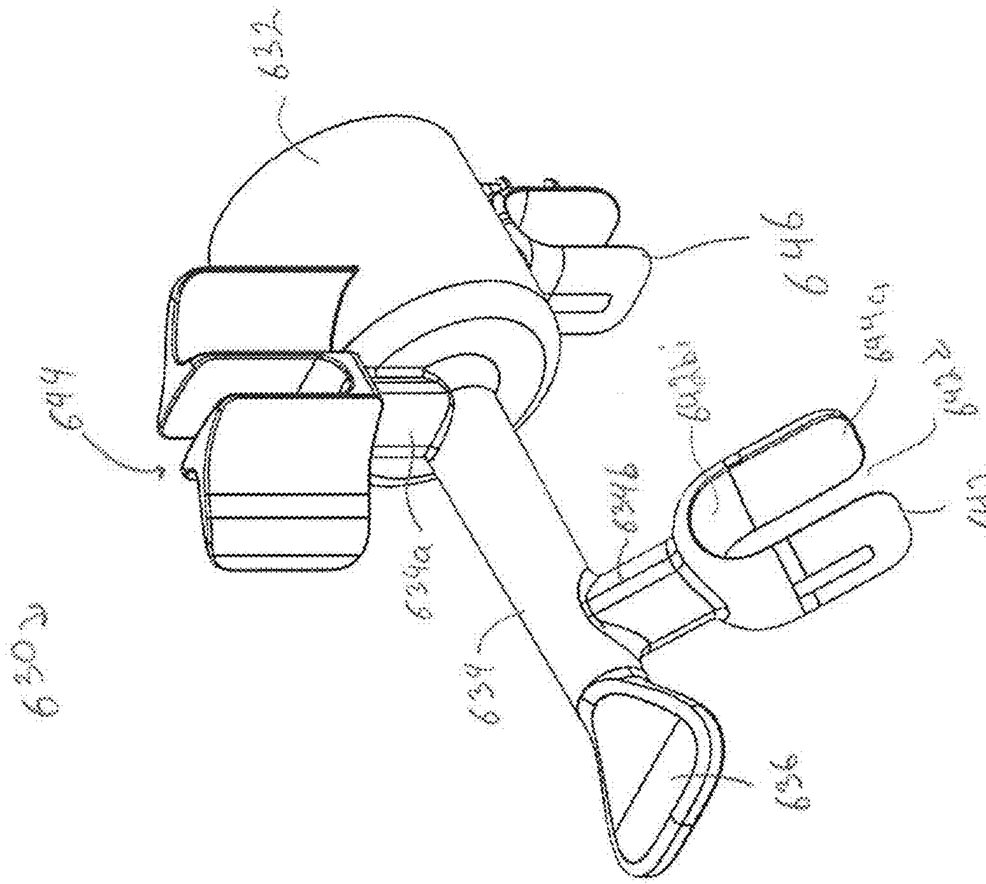

630
632
649
646
634a
634
636
642

FIG. 9A

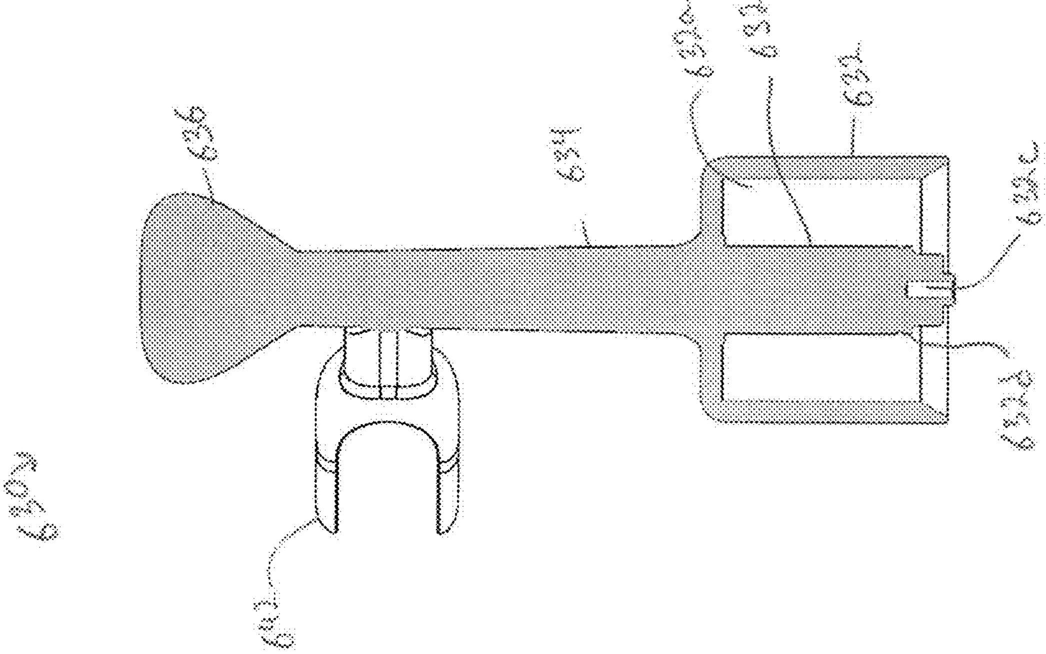

630
636
634
632a
632b
632
632c
632d
642

FIG. 9B

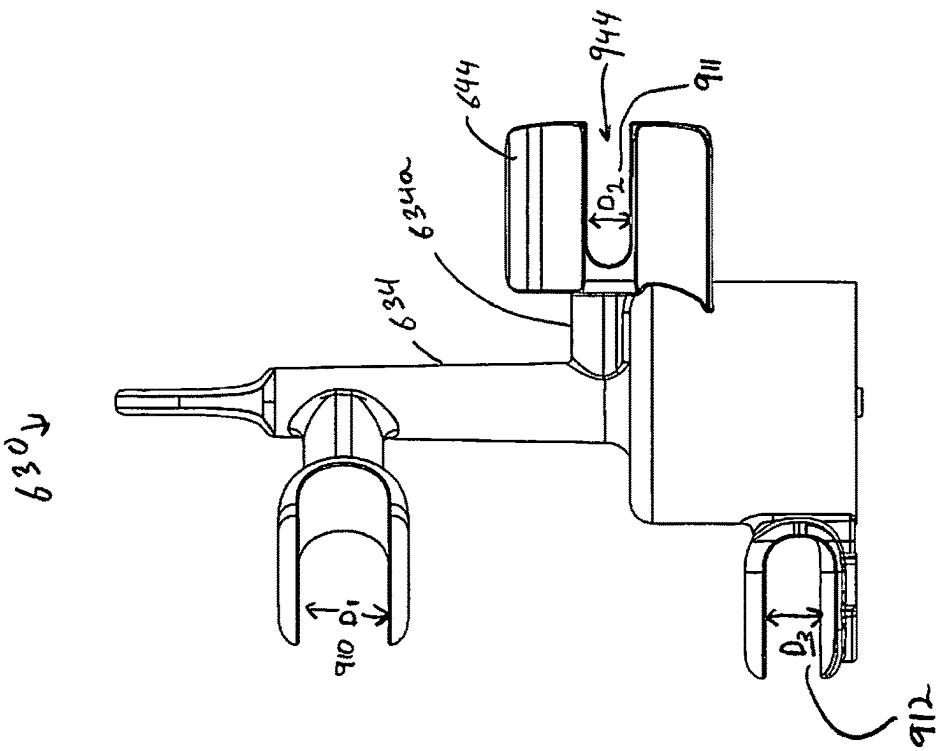

630
634
634a
644
944
911
D2
910 D1
D3
912

FIG. 9D

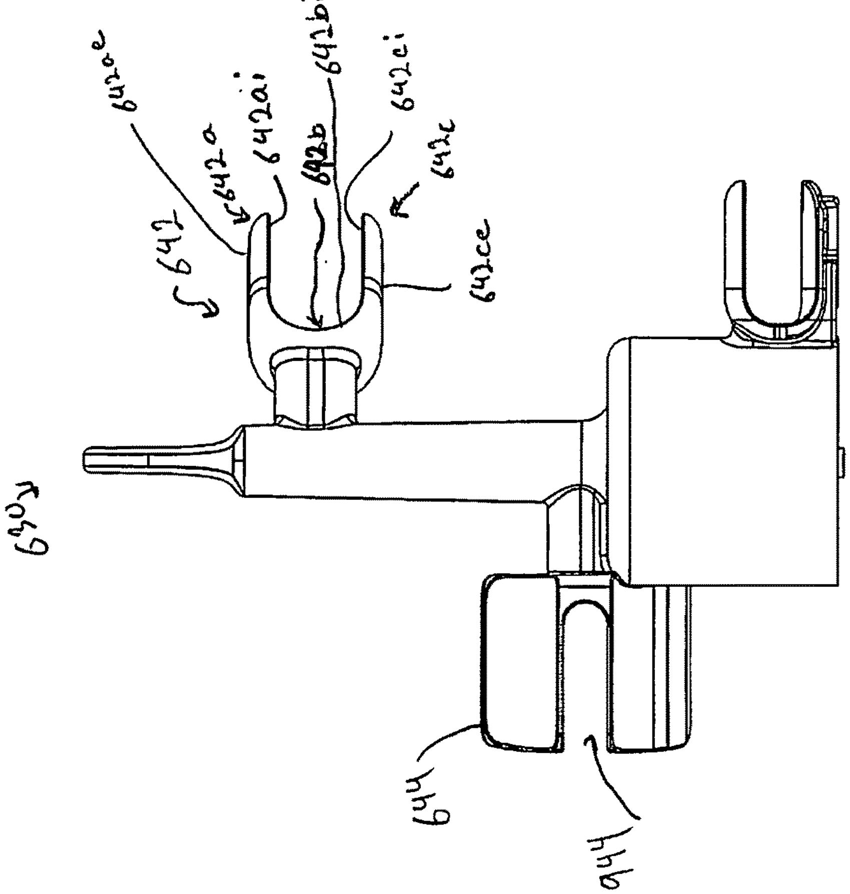

640
642
642a
642ae
642ai
642b
642bi
642ci
642c
642ce
644
944

FIG. 9C

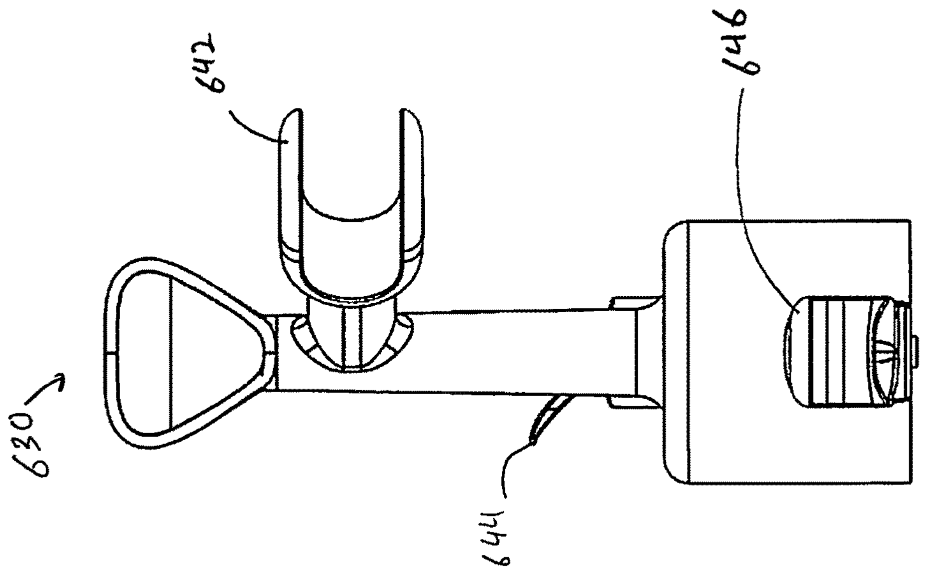


FIG. 9F

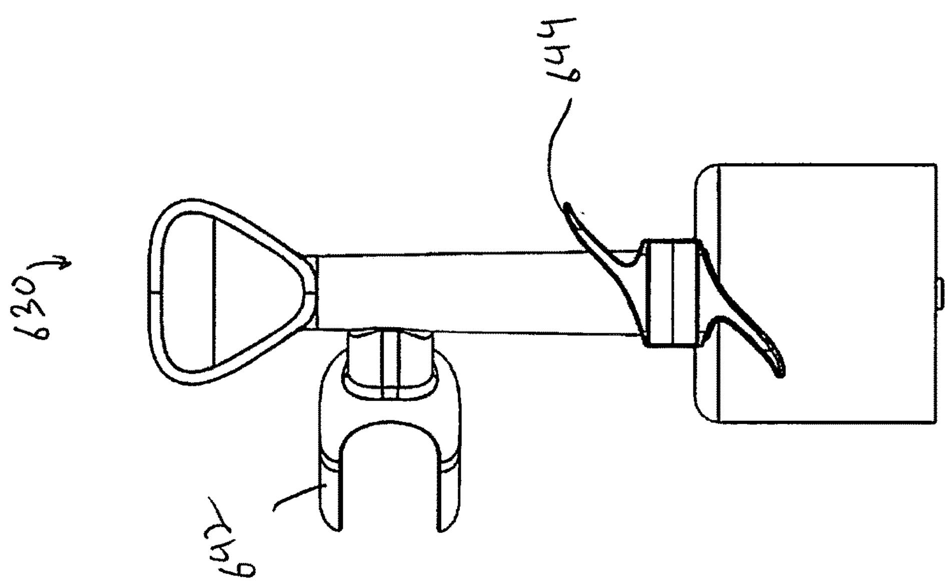


FIG. 9E

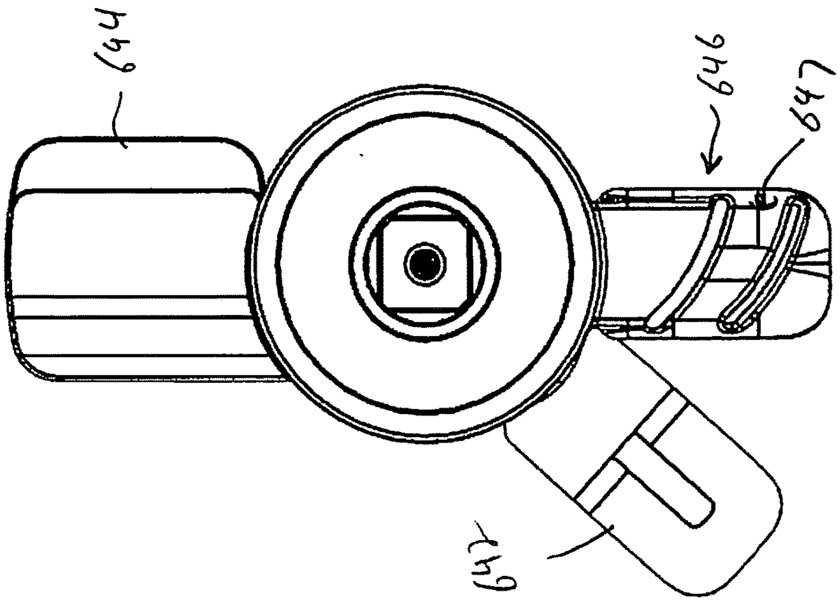


FIG. 9H

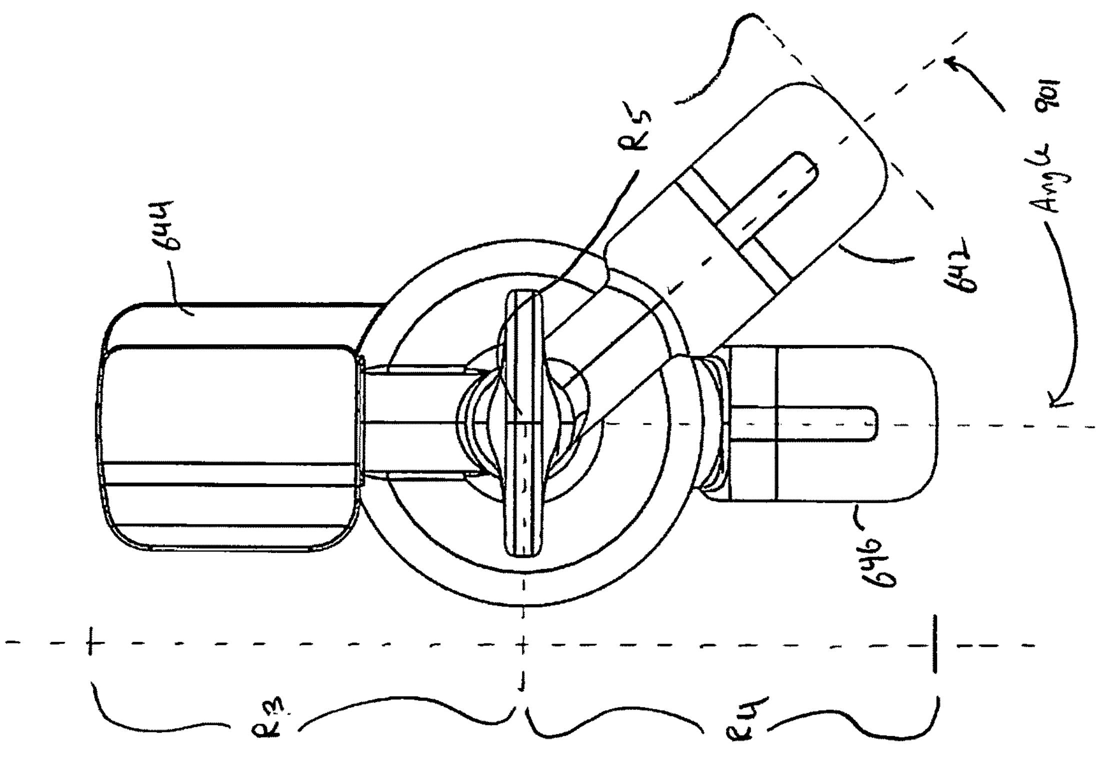


FIG. 9G

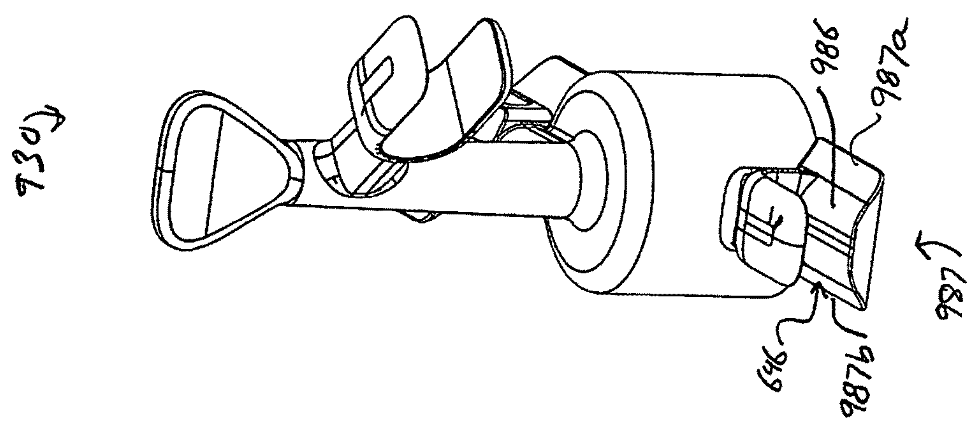


FIG. 9K

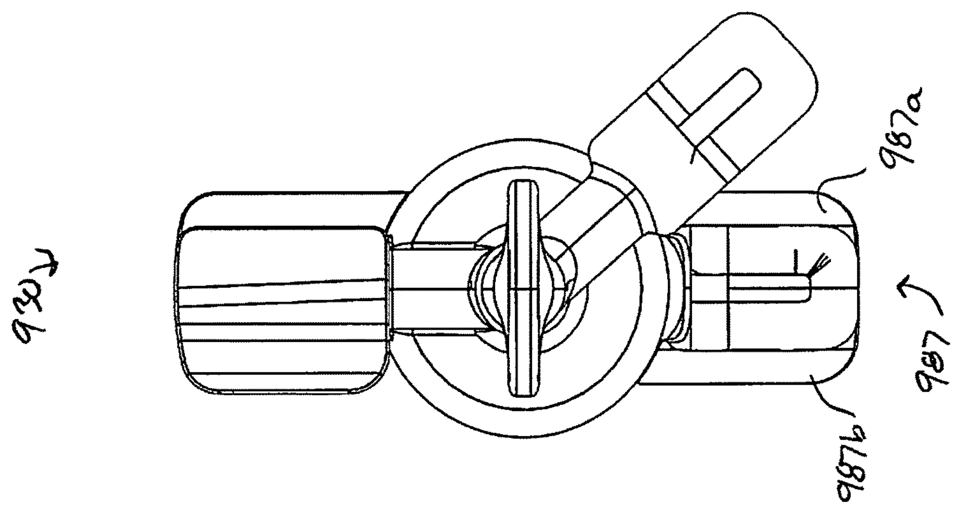


FIG. 9J

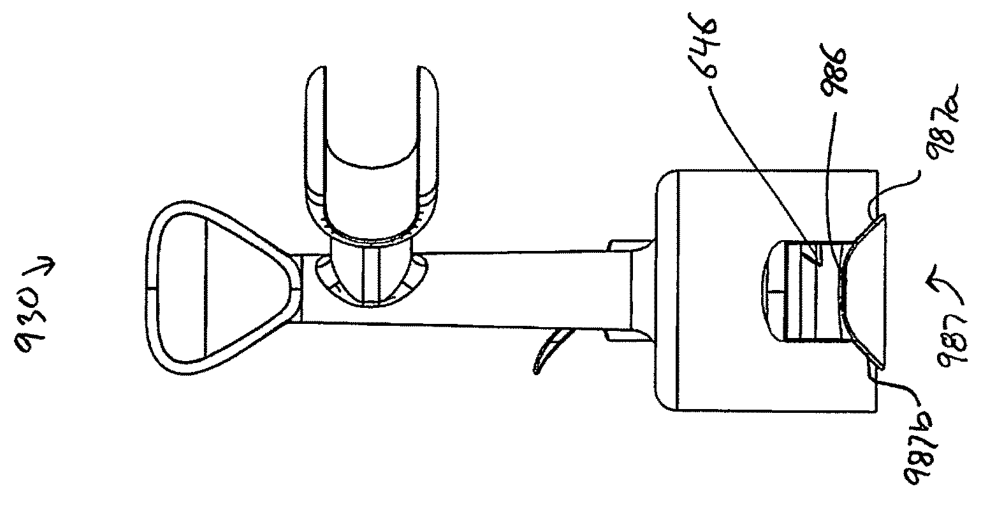


FIG. 9I

1000

1010 inserting the bucket assembly into the liner structure to cause first and second impeller couplers to interface with the first and second drivetrain couplers, respectively

1020 in response to confirming that the bucket assembly is present within the liner structure and the organic matter processing apparatus is ready to commence a processing action, instructing the motor to rotate in a first direction, which causes the gearbox to actuate and rotate the first and second drive shafts

1030 rotating the first and second impeller assemblies in a first rotation direction in response to rotation of the first and second drive shafts, wherein the first impeller assembly rotates about a first vertical axis within the metal housing of the bucket assembly and includes at least a first cutting member and a first integrated cutting and paddle member, wherein the second impeller assembly rotates about a second vertical axis within the metal housing and includes at least a second cutting member and a second integrated cutting and paddle member, wherein the first blade array interfaces with the first cutting member and the first integrated cutting and paddle member during each rotation of the first impeller assembly, and wherein the second blade array interfaces with the second cutting member and the second integrated cutting and paddle member during each rotation of the second impeller assembly

1040 heating the metal housing with a heat plate

1050 operating a first fan to draw in ambient air from outside of the organic matter processing apparatus and that air is optionally heated and directed into the bucket assembly

1060 operating a second fan to pull untreated air out of the bucket assembly and routes the untreated air through an air treatment system that converts the untreated air to treated air suitable for expulsion from the organic matter processing apparatus

FIG. 10

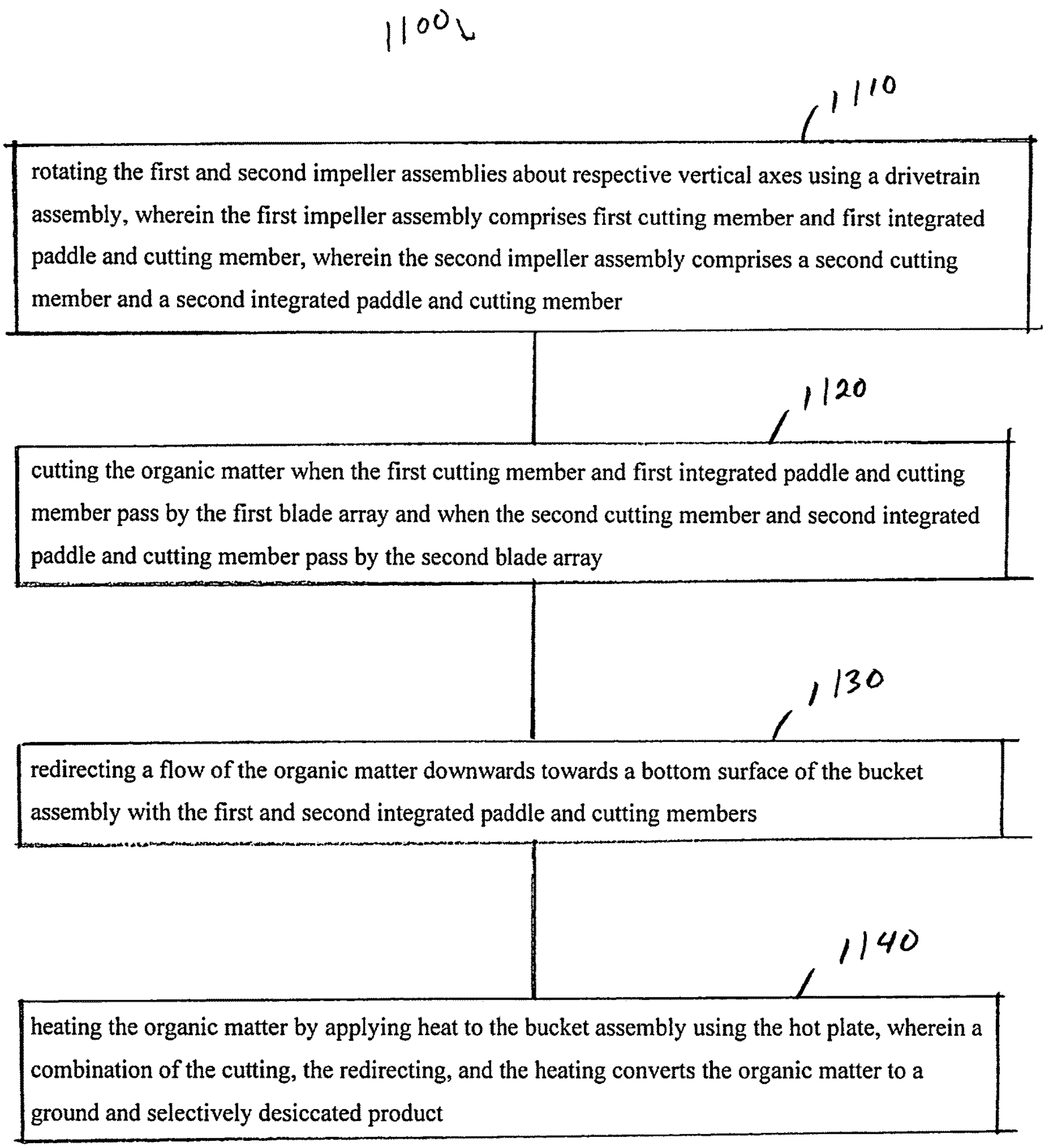

1100
1110
rotating the first and second impeller assemblies about respective vertical axes using a drivetrain assembly, wherein the first impeller assembly comprises first cutting member and first integrated paddle and cutting member, wherein the second impeller assembly comprises a second cutting member and a second integrated paddle and cutting member
1120
cutting the organic matter when the first cutting member and first integrated paddle and cutting member pass by the first blade array and when the second cutting member and second integrated paddle and cutting member pass by the second blade array
1130
redirecting a flow of the organic matter downwards towards a bottom surface of the bucket assembly with the first and second integrated paddle and cutting members
1140
heating the organic matter by applying heat to the bucket assembly using the hot plate, wherein a combination of the cutting, the redirecting, and the heating converts the organic matter to a ground and selectively desiccated product

FIG. 11

1200

1210

asynchronously rotating first and second impeller assemblies in response to operation of a drivetrain assembly, wherein the first and second impeller assemblies rotate about respective vertical axes within an ellipsoid shaped metal housing comprising a first vertically oriented blade array secured to an inner surface of the metal housing within a first radial sweep zone of the first impeller assembly and a second vertically oriented blade array secured to the inner surface within a second radial sweep zone of the second impeller assembly, wherein the first impeller assembly comprises first and second cutting members and a first paddle and cutting member, wherein the second impeller assembly comprises a third cutting member and a second paddle and cutting member, and wherein during rotation of the first impeller assembly, the first and second cutting members and the first paddle and cutting member interact with respective blades of the first blade array, and during rotation of the second impeller assembly, the third cutting member and the second paddle and cutting member interact with respective blades of the second blade array

1220

heating the metal housing with a hot plate that interfaces with a hot plate facing surface of the metal housing

FIG. 12

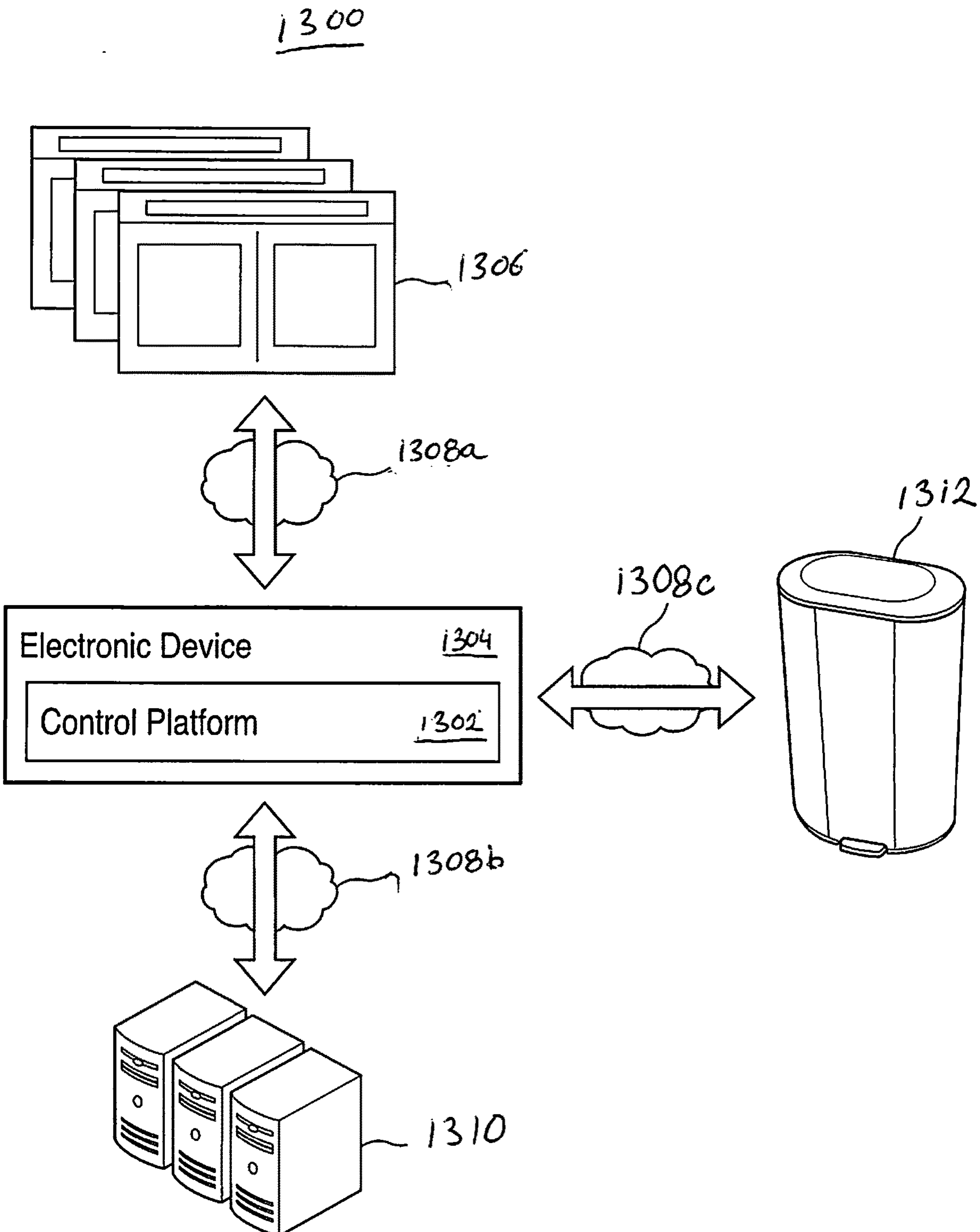

1300
1306
1308a
1312
1308c
Electronic Device
1304
Control Platform
1302
1308b
1310

FIG. 13

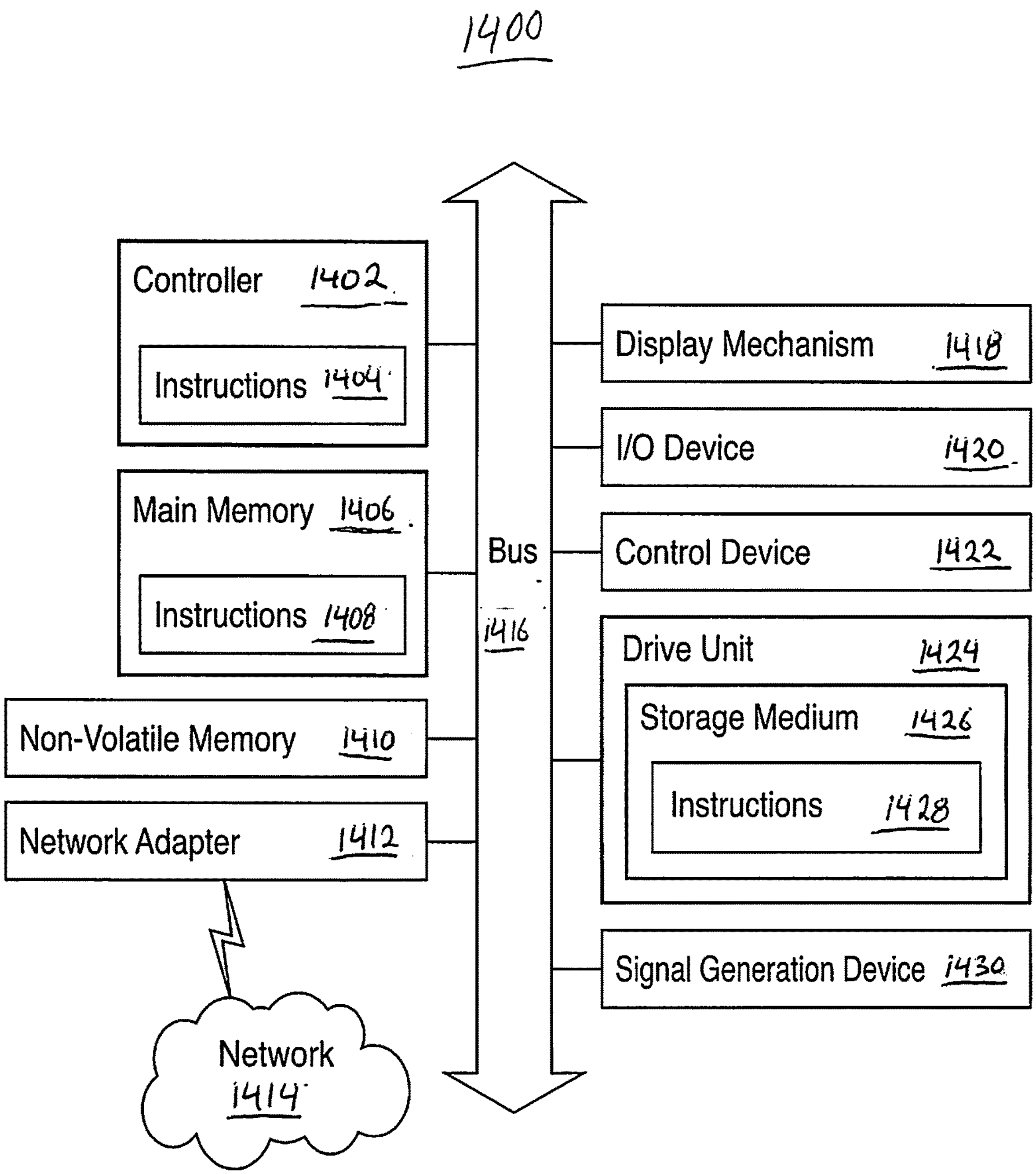

1400
Controller 1402
Instructions 1404
Main Memory 1406
Instructions 1408
Non-Volatile Memory 1410
Network Adapter 1412
Network 1414
Bus 1416
Display Mechanism 1418
I/O Device 1420
Control Device 1422
Drive Unit 1424
Storage Medium 1426
Instructions 1428
Signal Generation Device 1430

FIG. 14

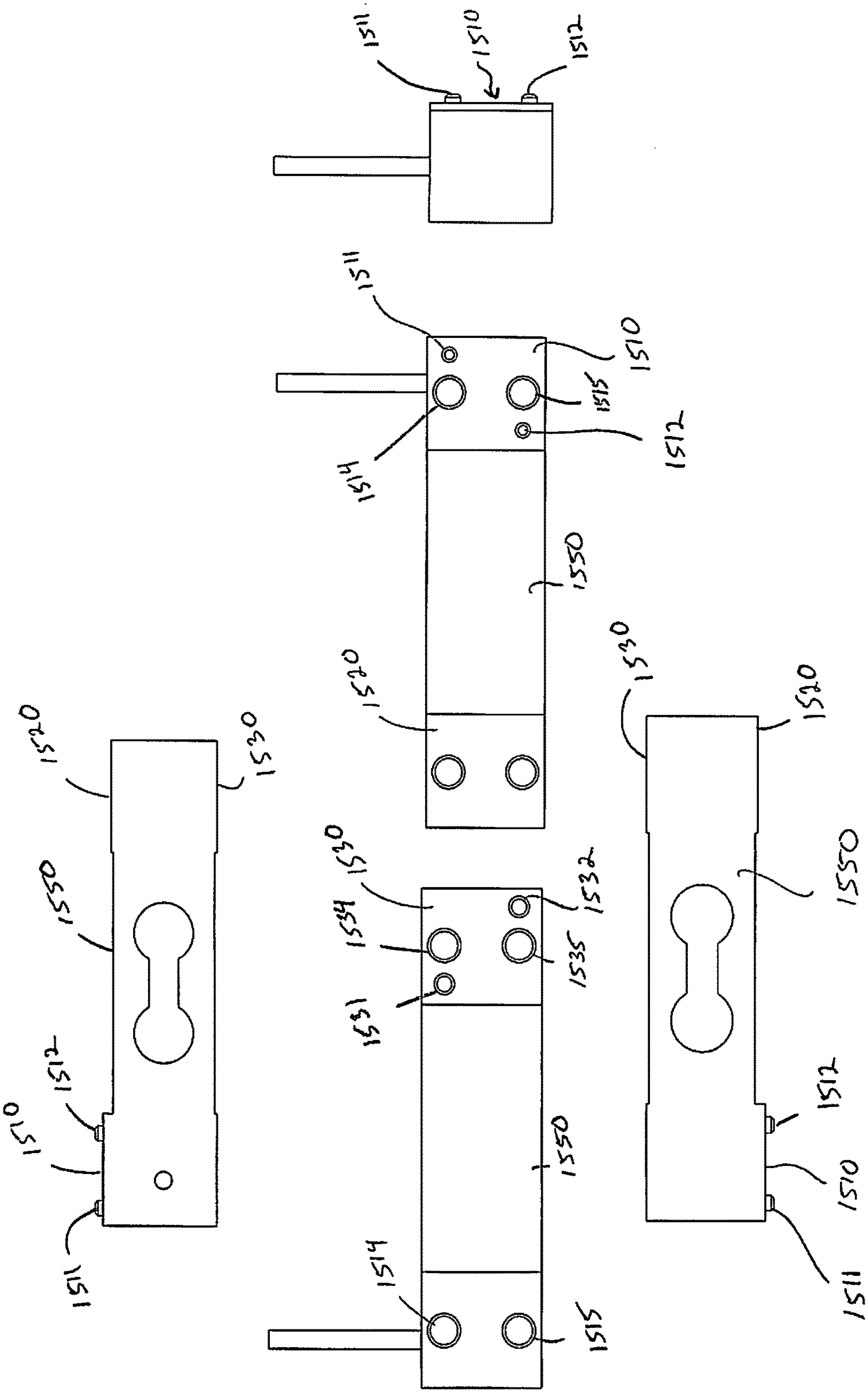


FIG. 15A

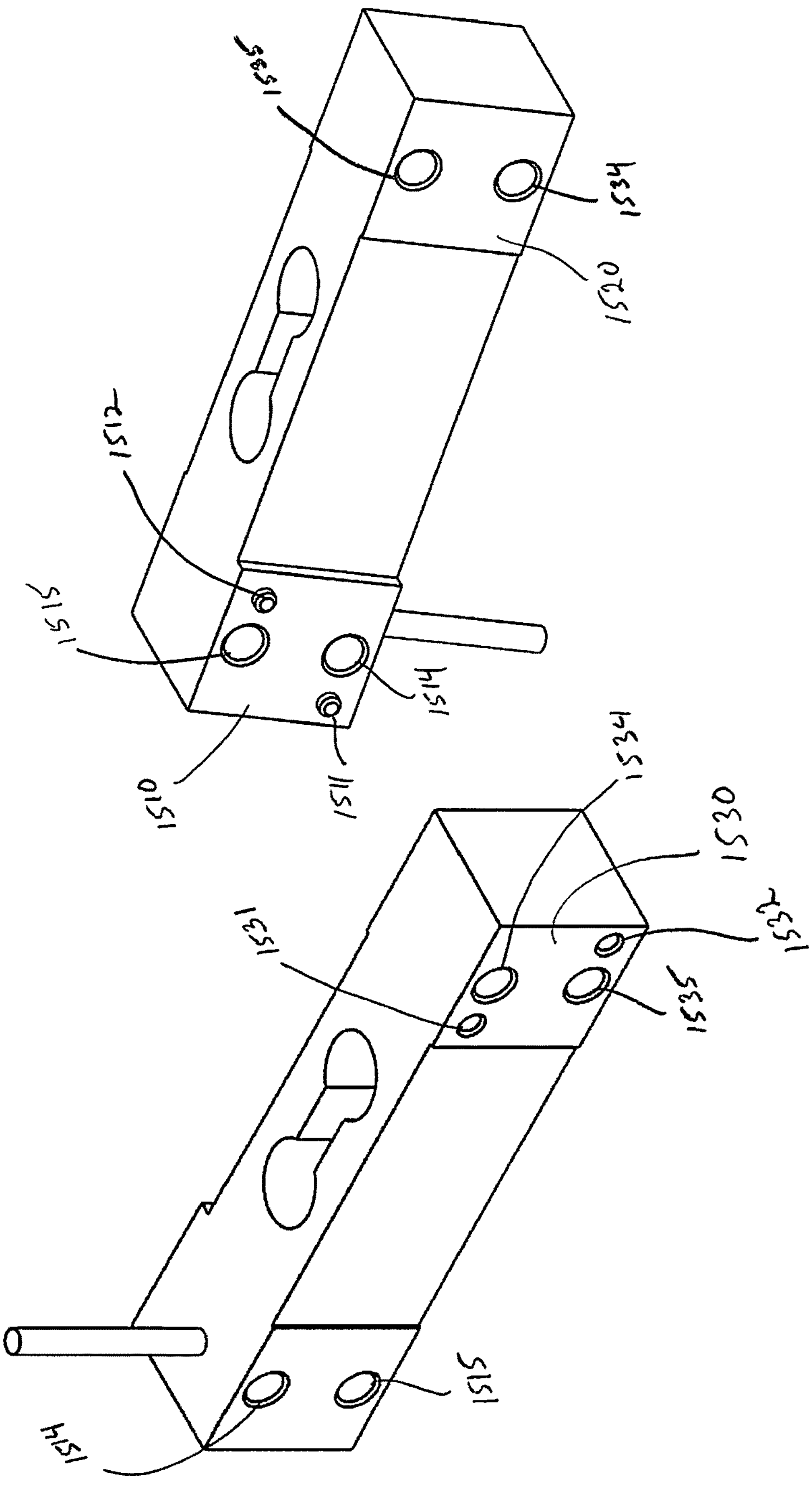

1535
1534
1520
1512
1515
1514
1511
1510
1534
1530
1532
1531
1535
1515
1514

FIG. 15B

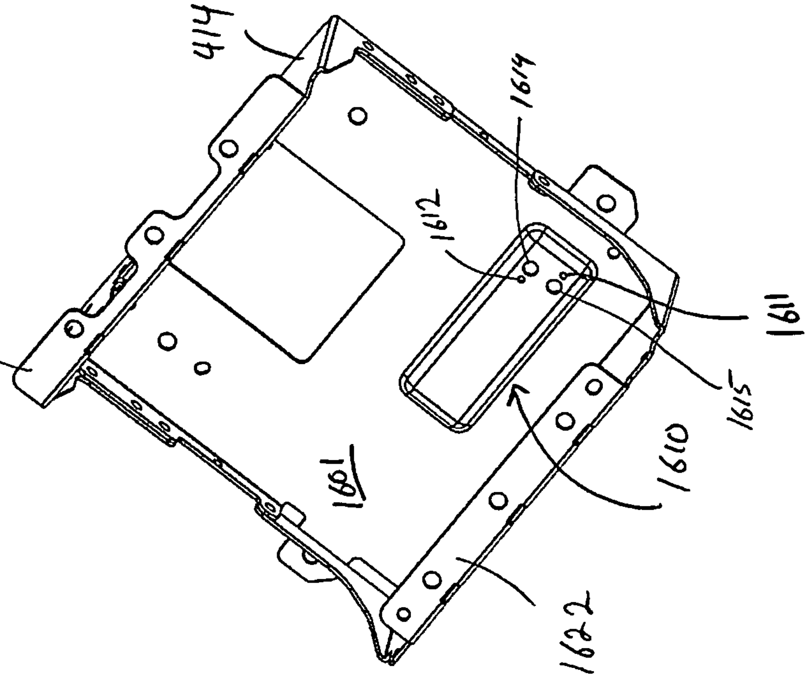


FIG. 16B

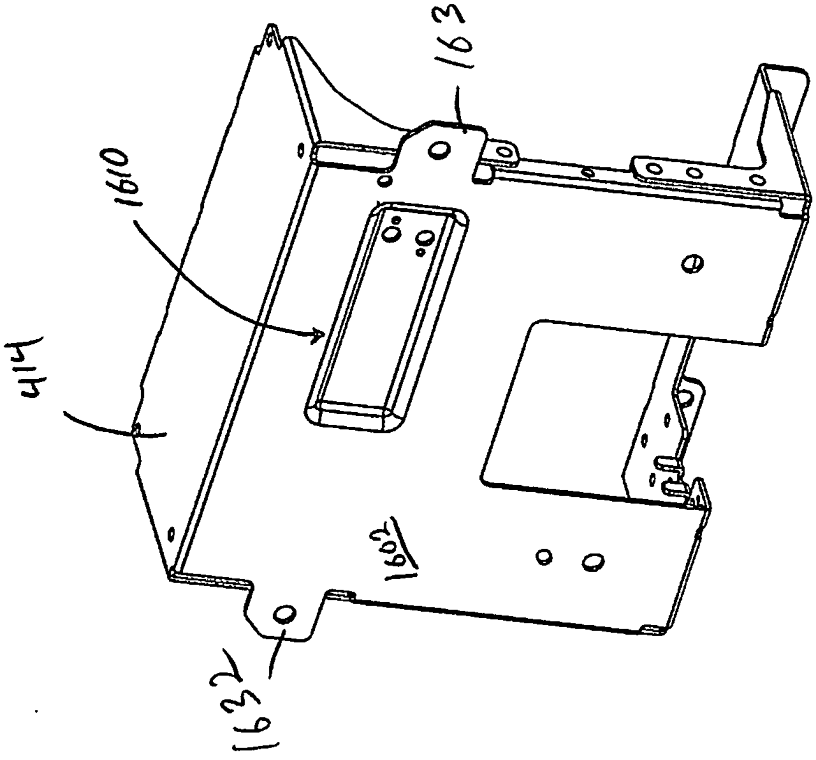


FIG. 16A

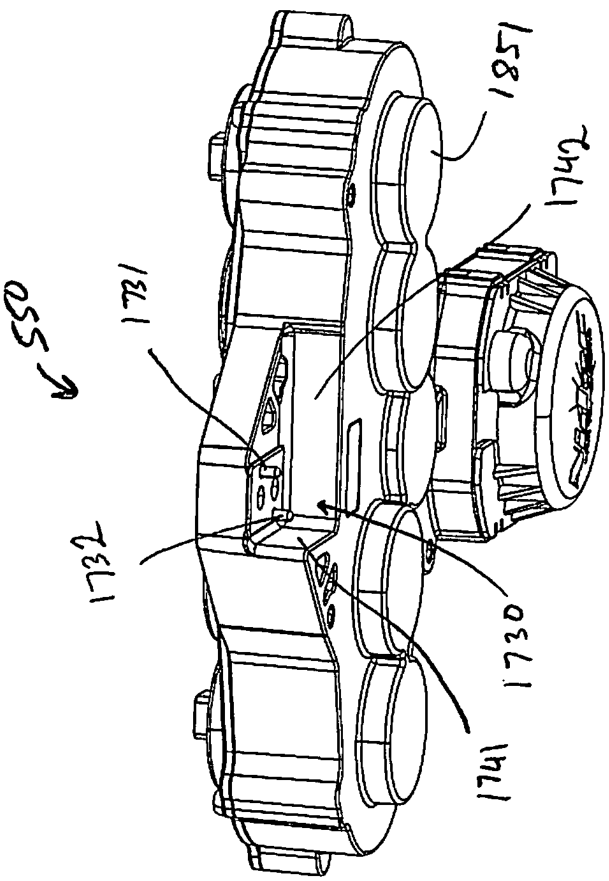


FIG. 17B

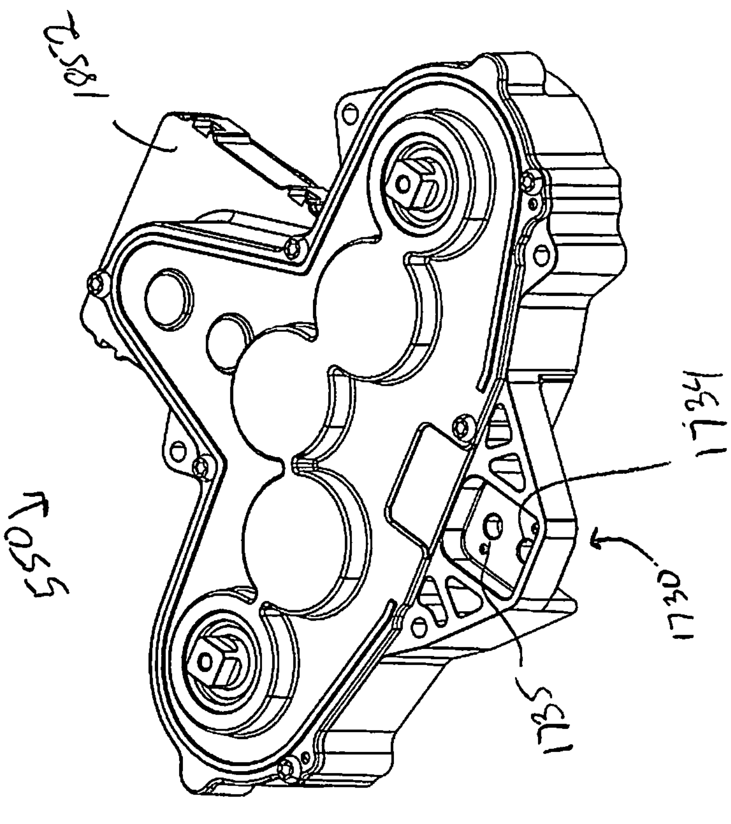


FIG. 17A

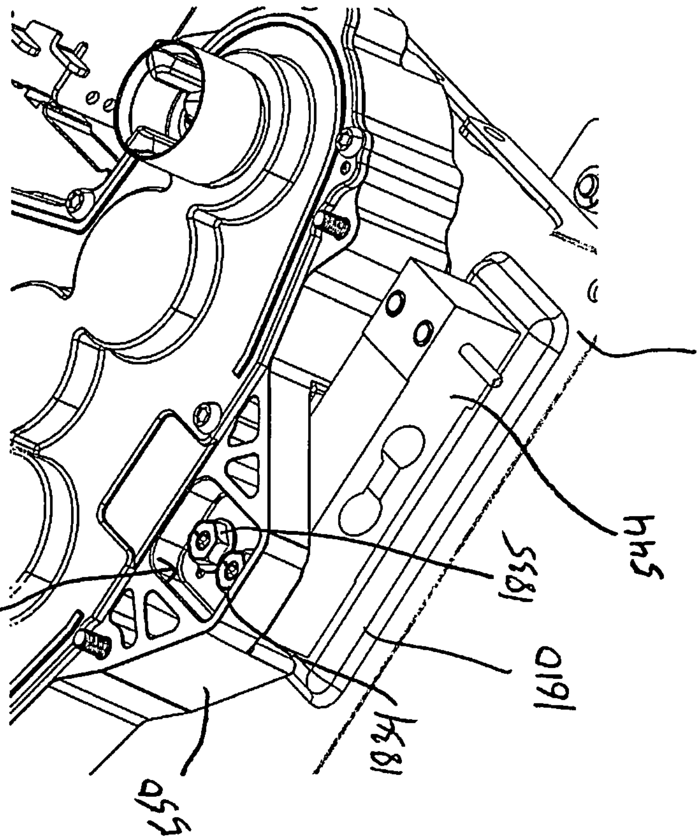


FIG. 18B

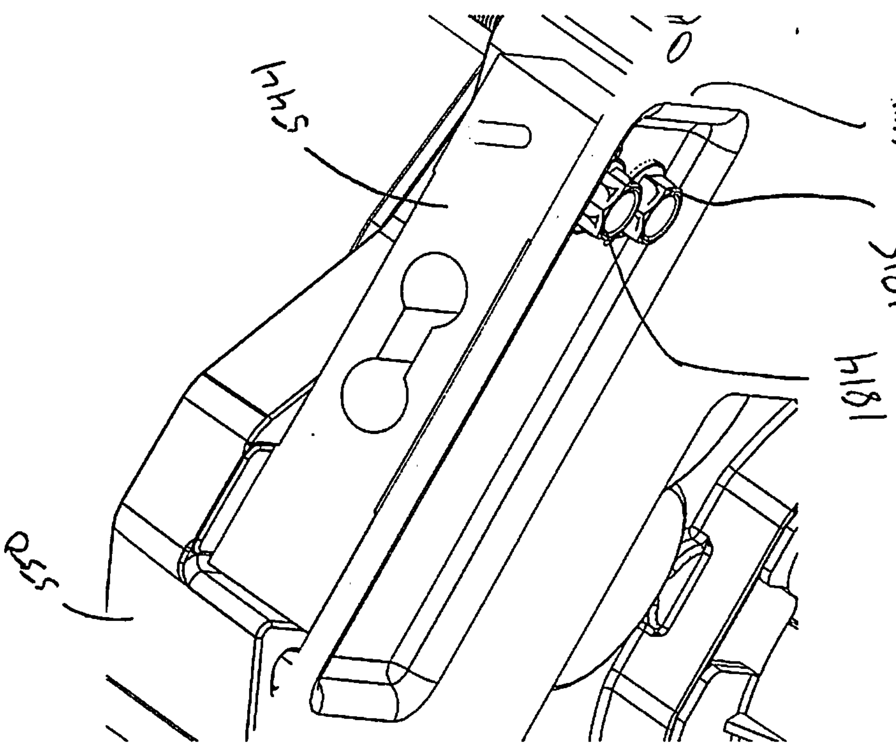


FIG. 18A

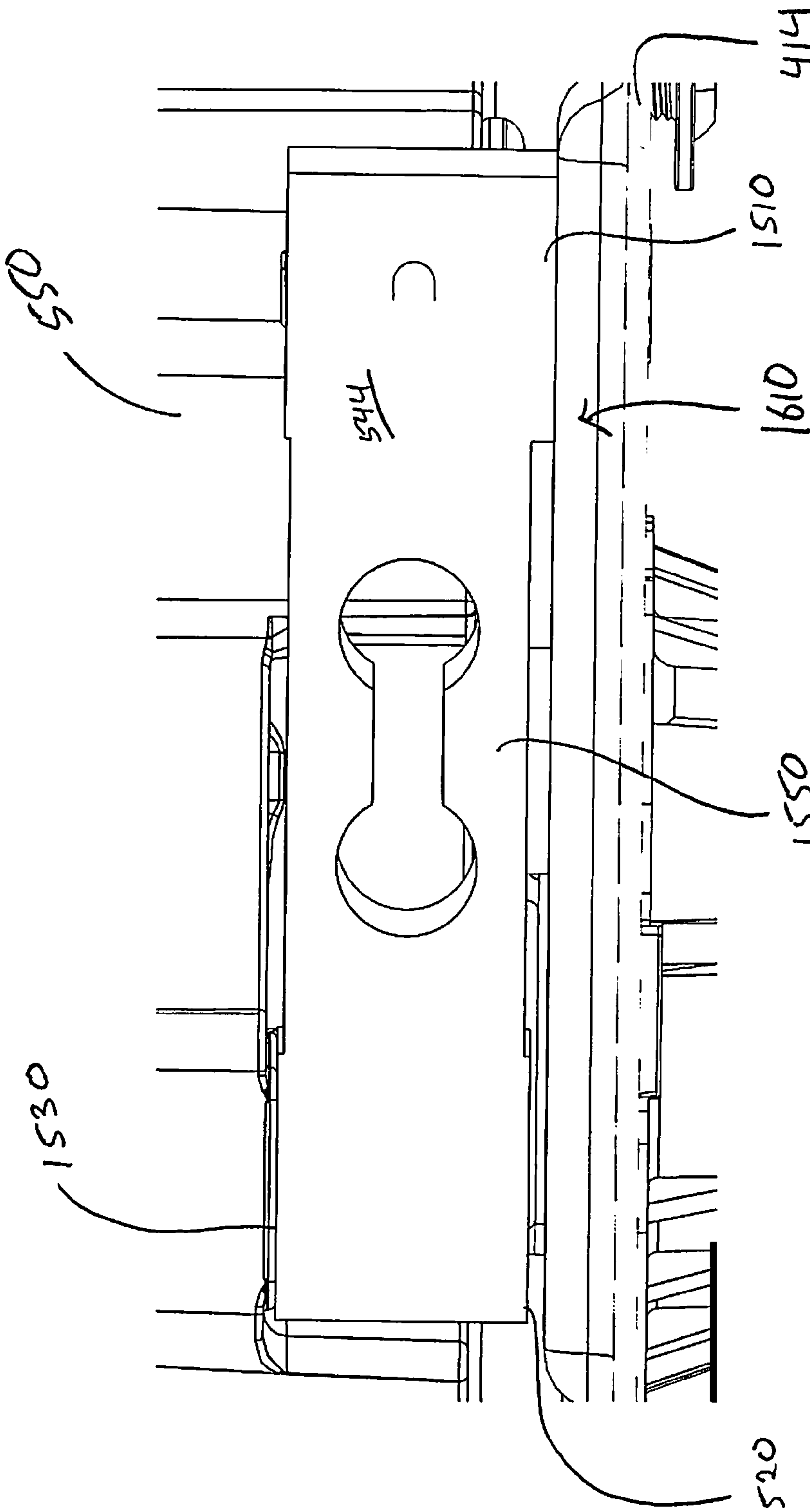


FIG. 18C

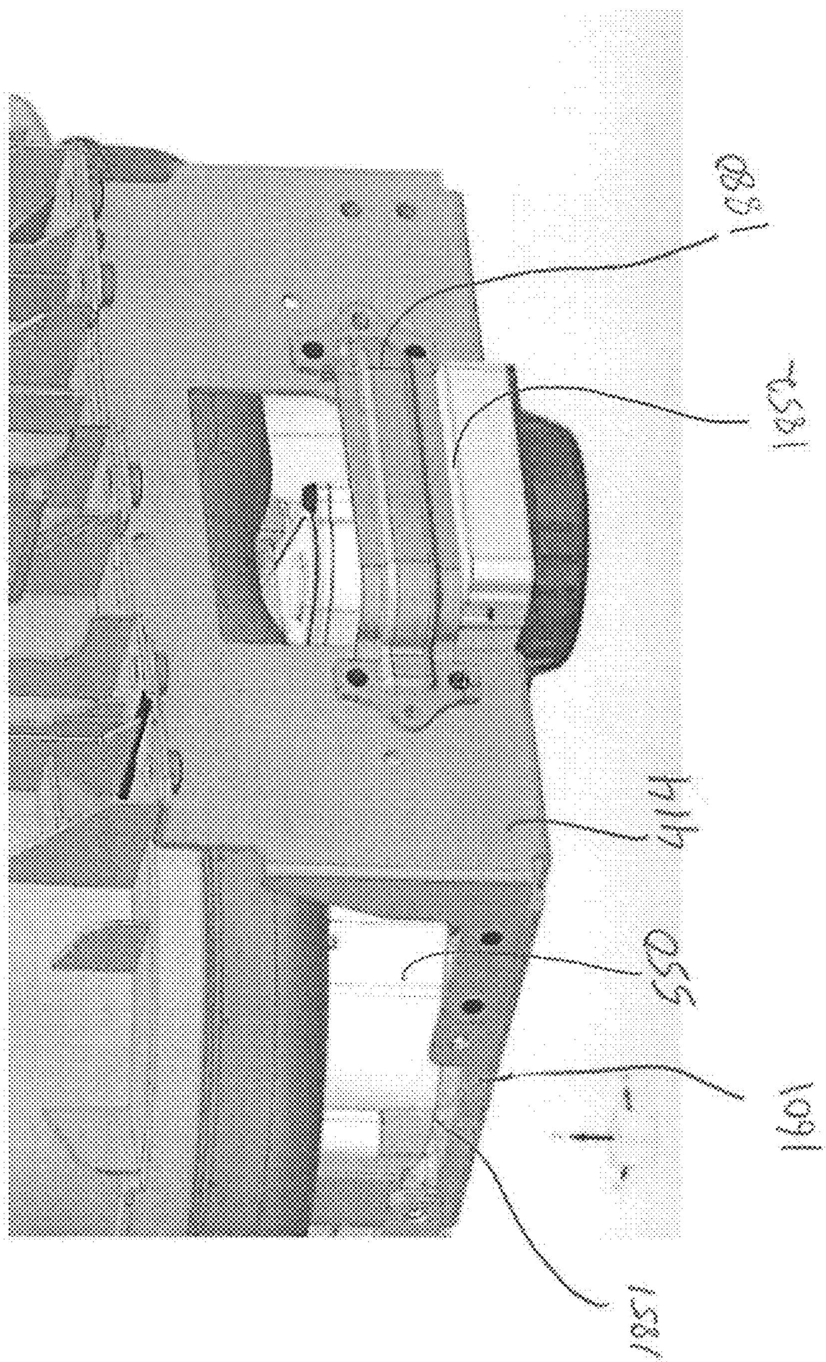


FIG. 18D

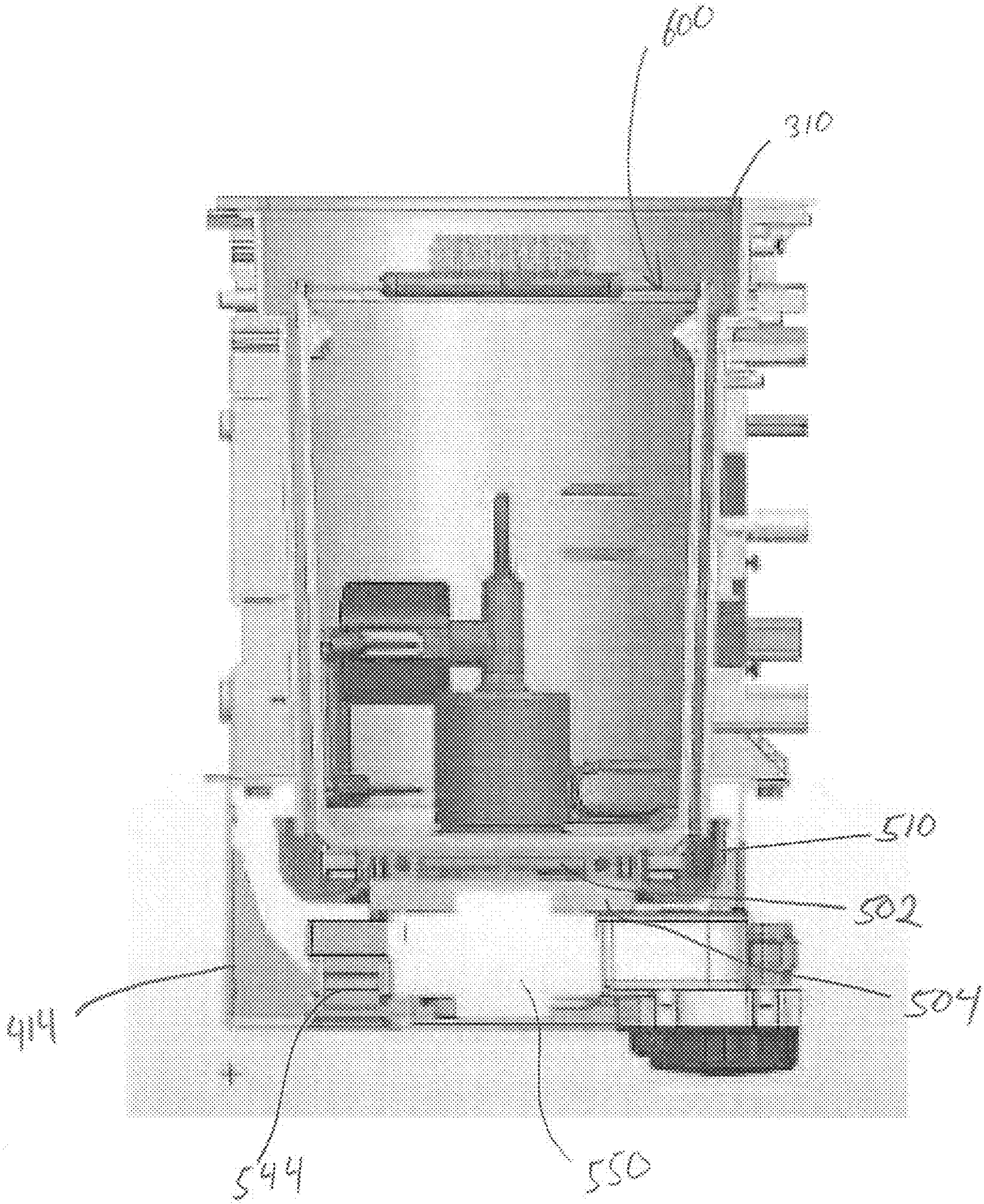


FIG. 19

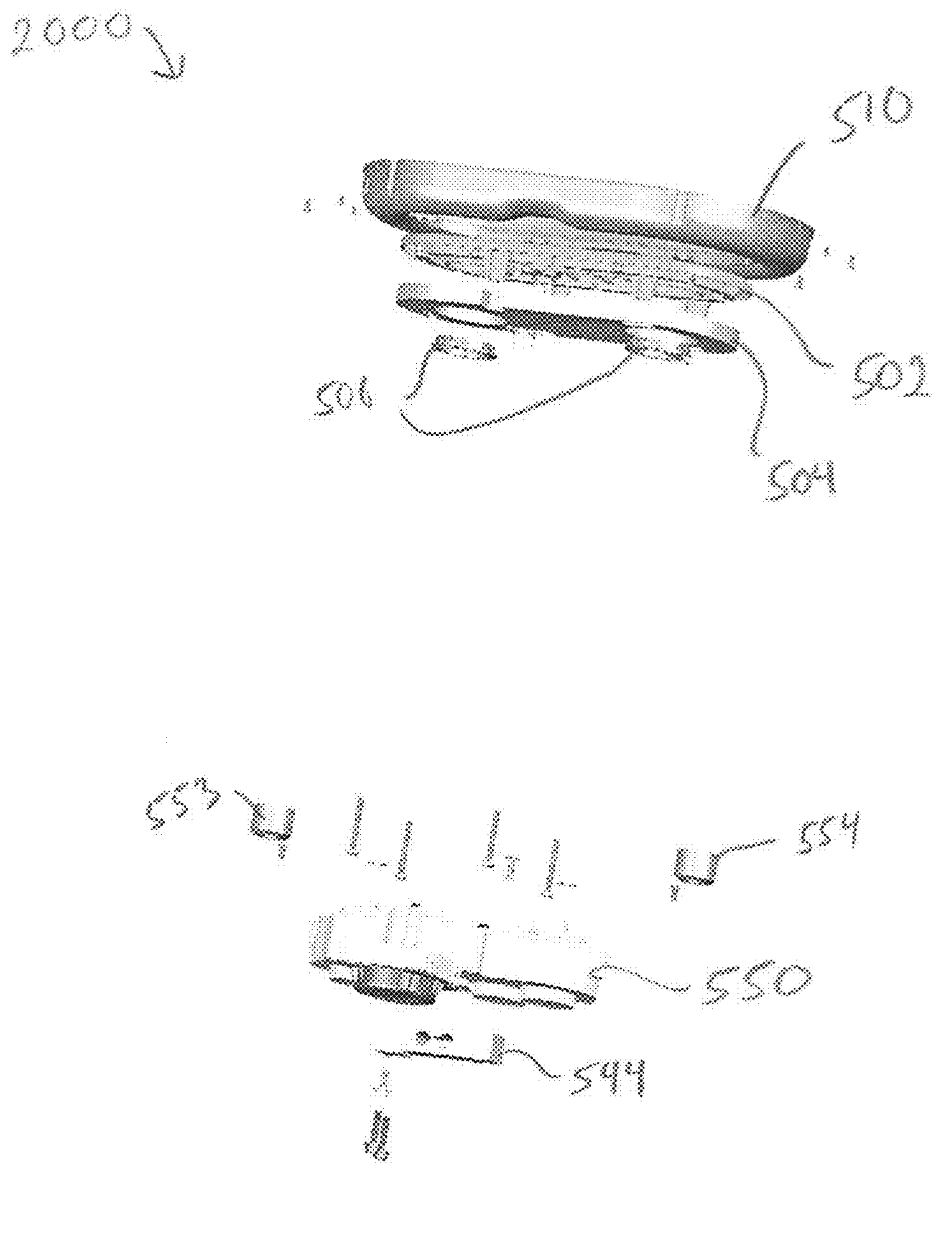


FIG. 20

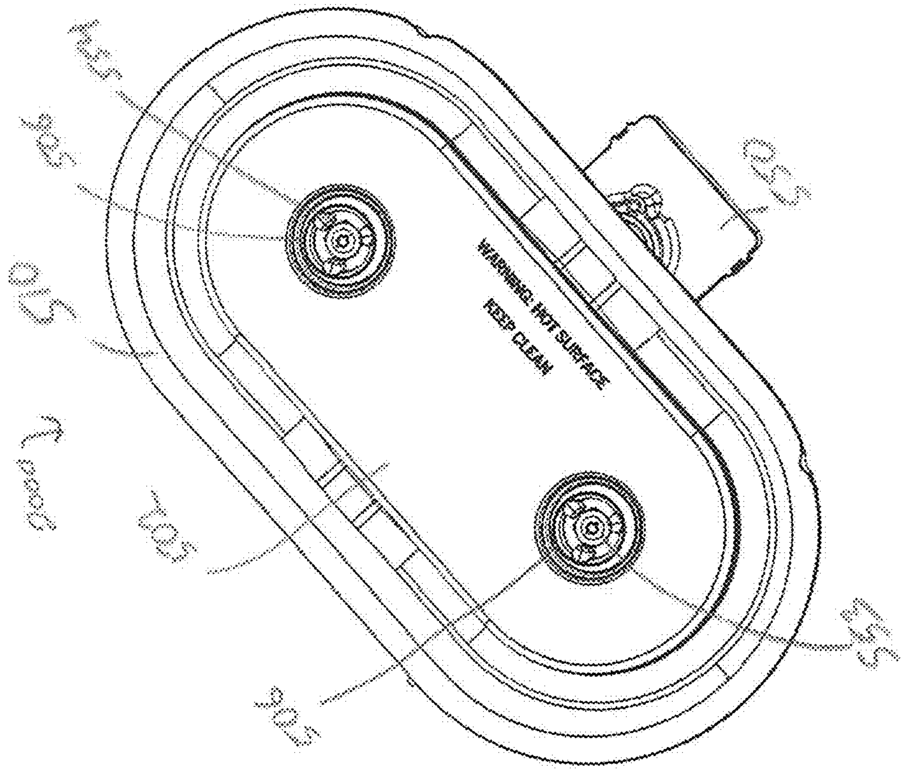


FIG. 20B

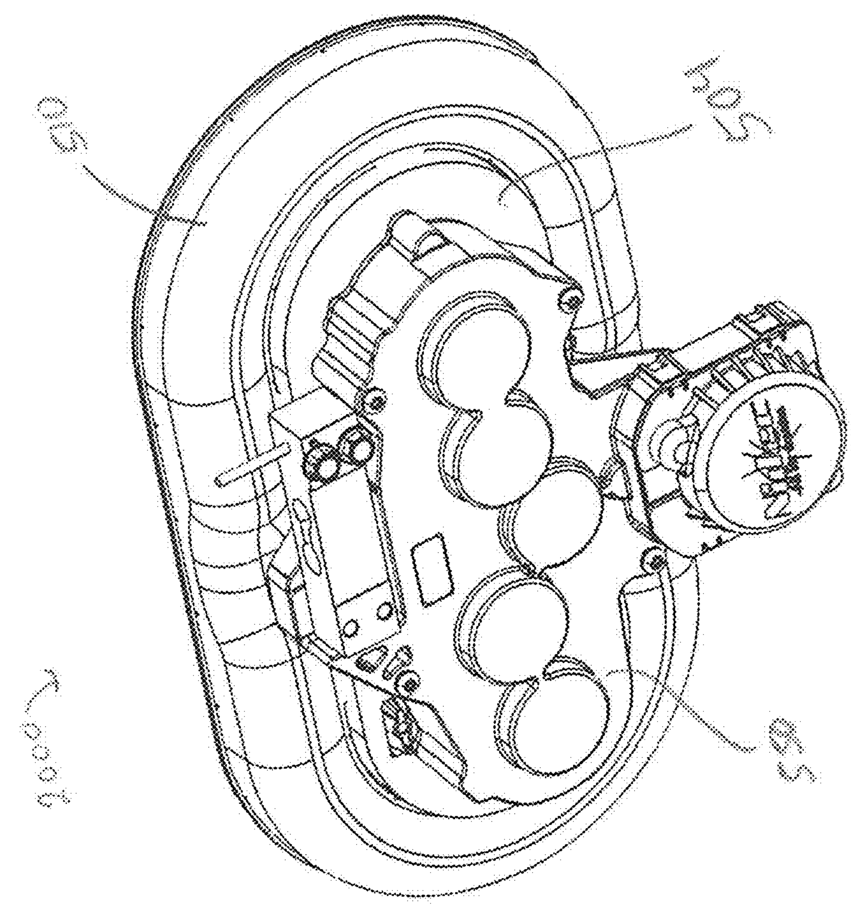


FIG. 20A

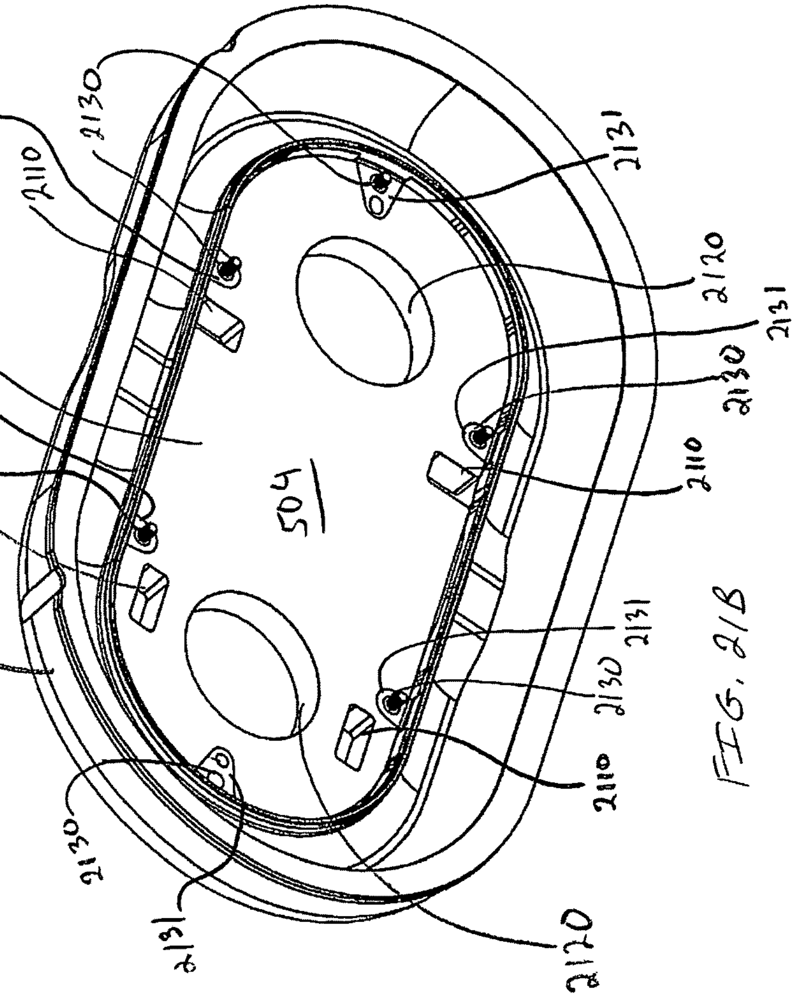


FIG. 21B

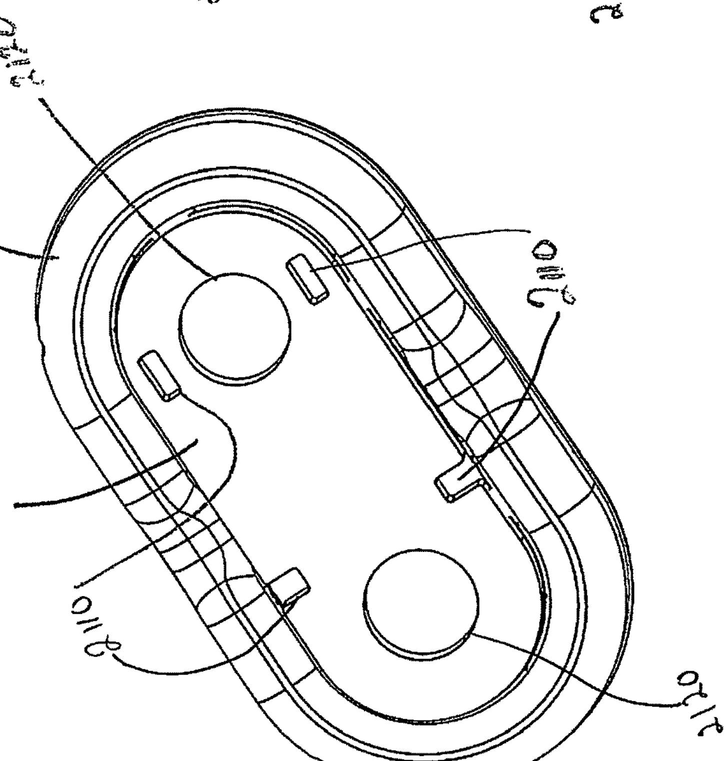


FIG. 21A

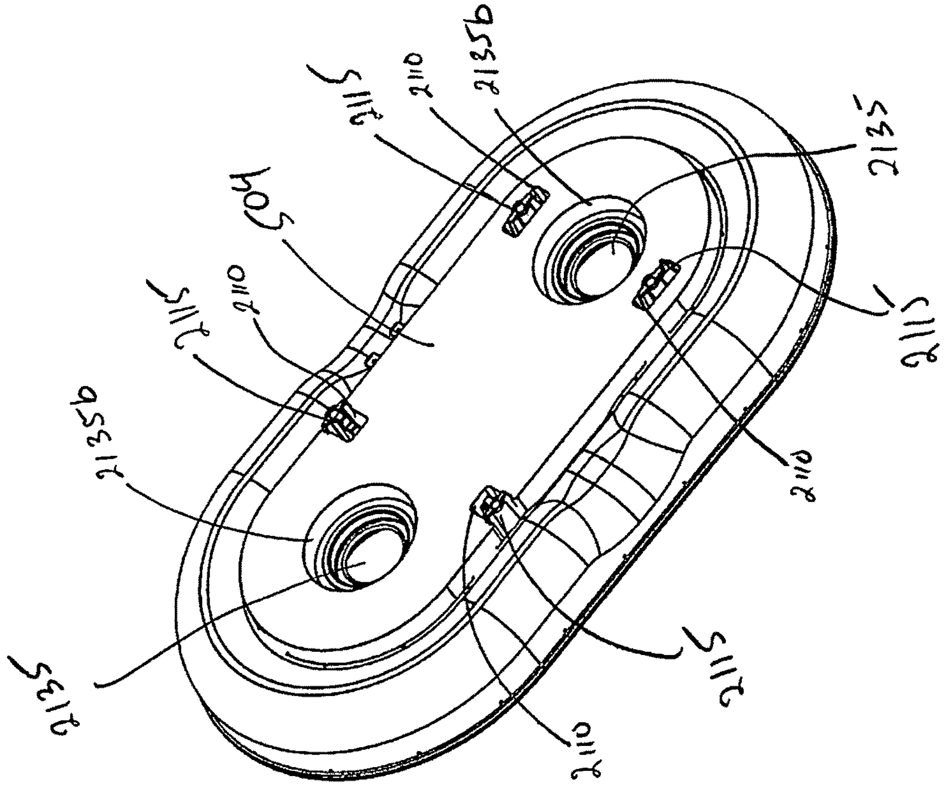


FIG. 22

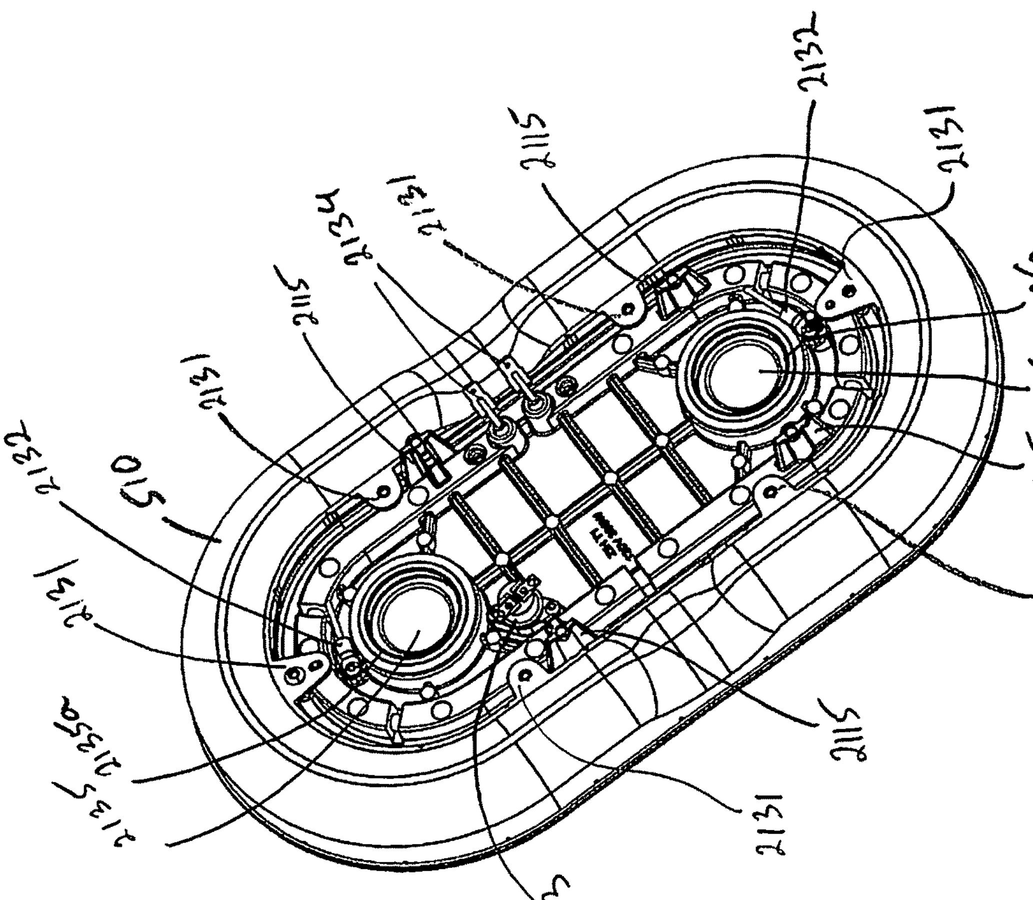


FIG. 21C

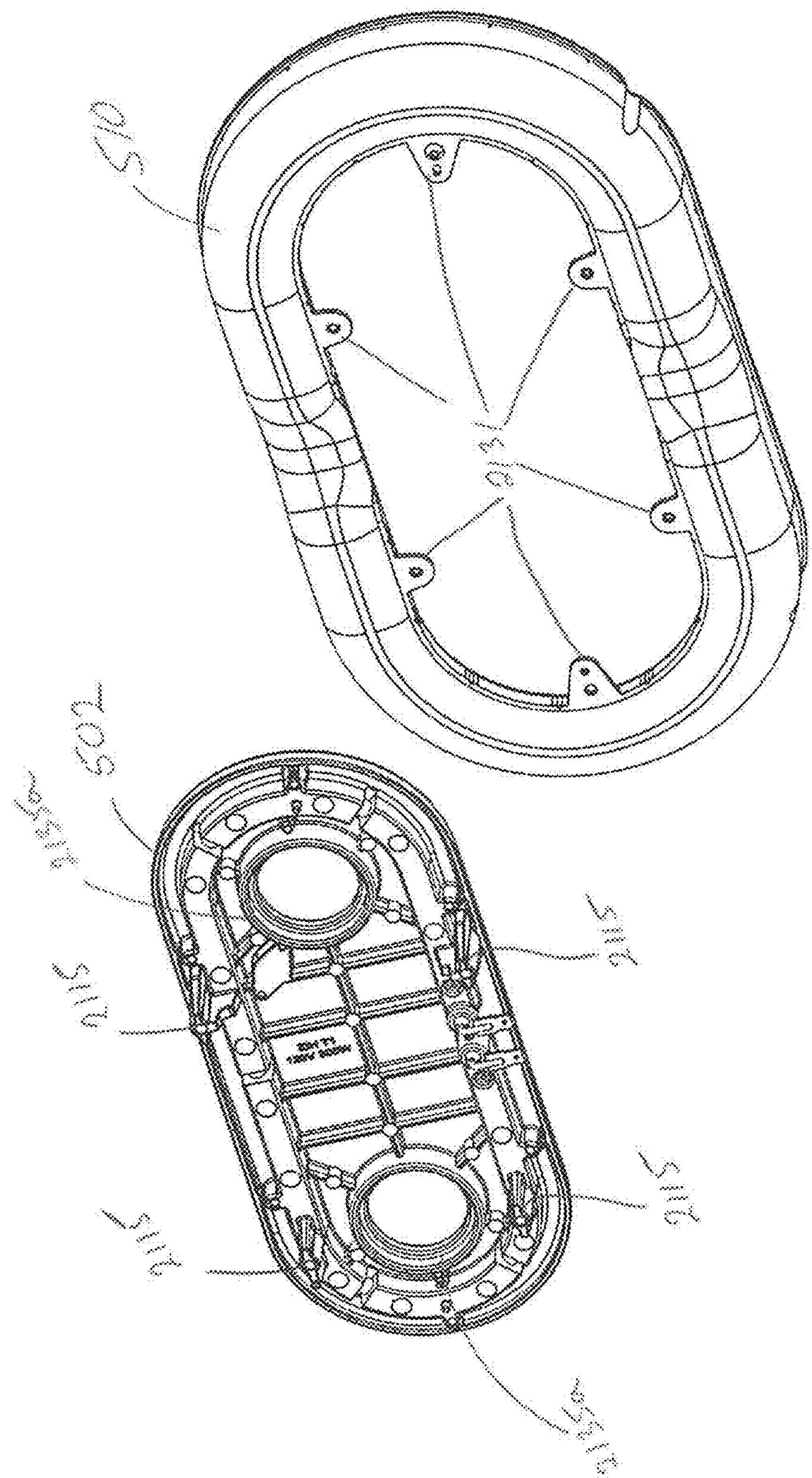


FIG. 21E

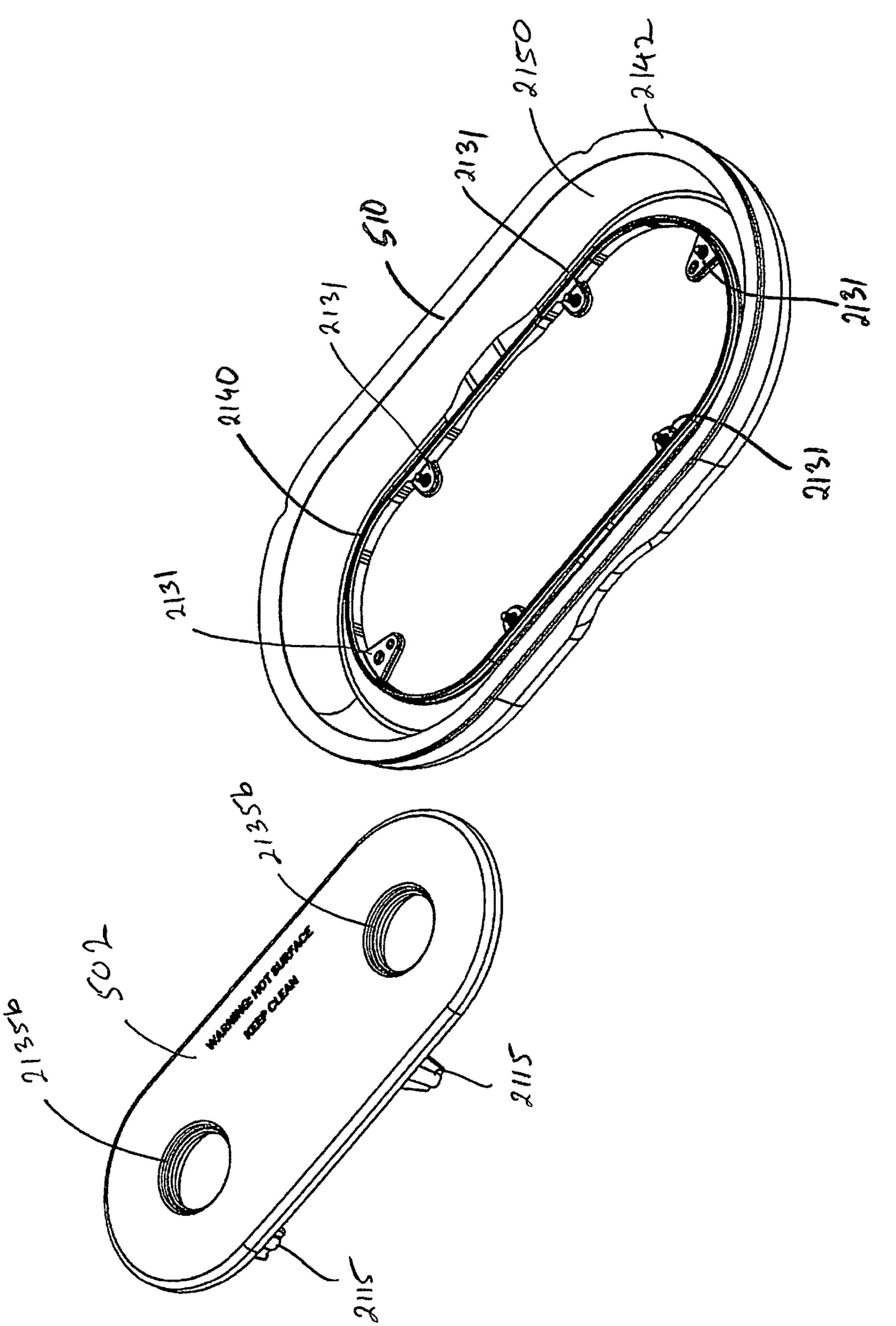

2142
2150
2131
510
2131
2131
2140
2131
2131
WARNING: HOT SURFACE
KEEP CLEAN
502
2135b
2135b
2115
2115

FIG. 21D

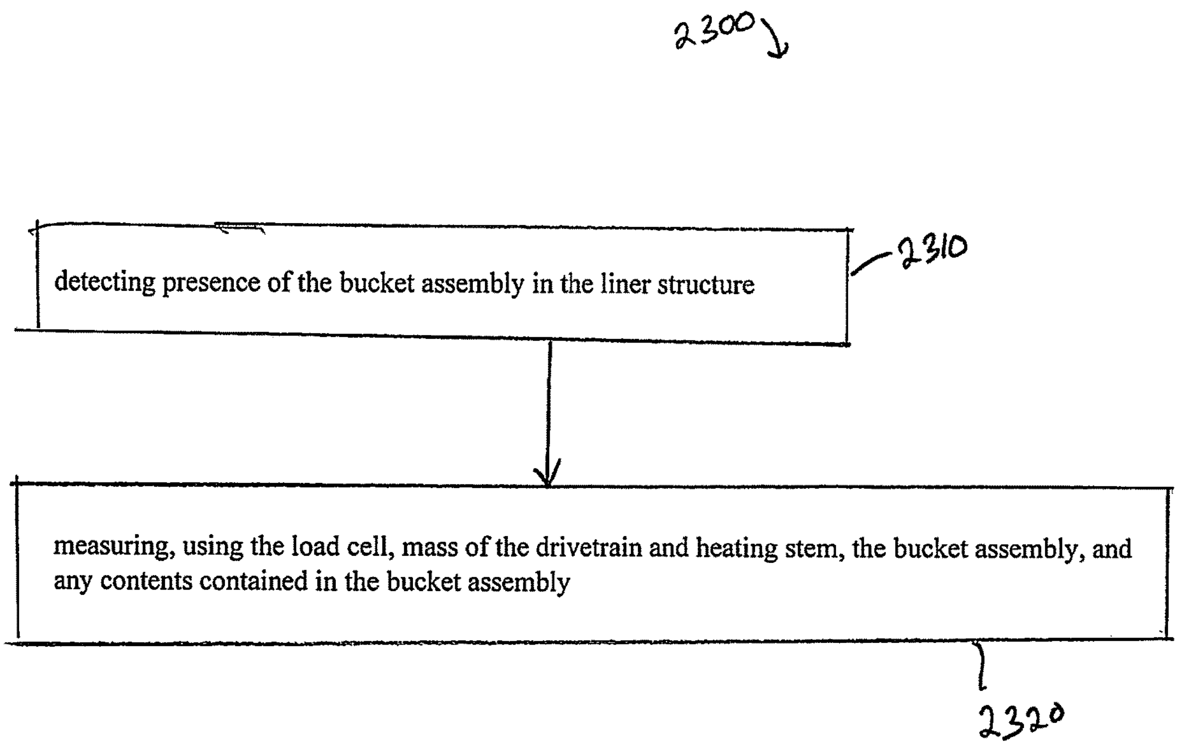

2300
detecting presence of the bucket assembly in the liner structure
2310
measuring, using the load cell, mass of the drivetrain and heating stem, the bucket assembly, and any contents contained in the bucket assembly
2320

FIG. 23

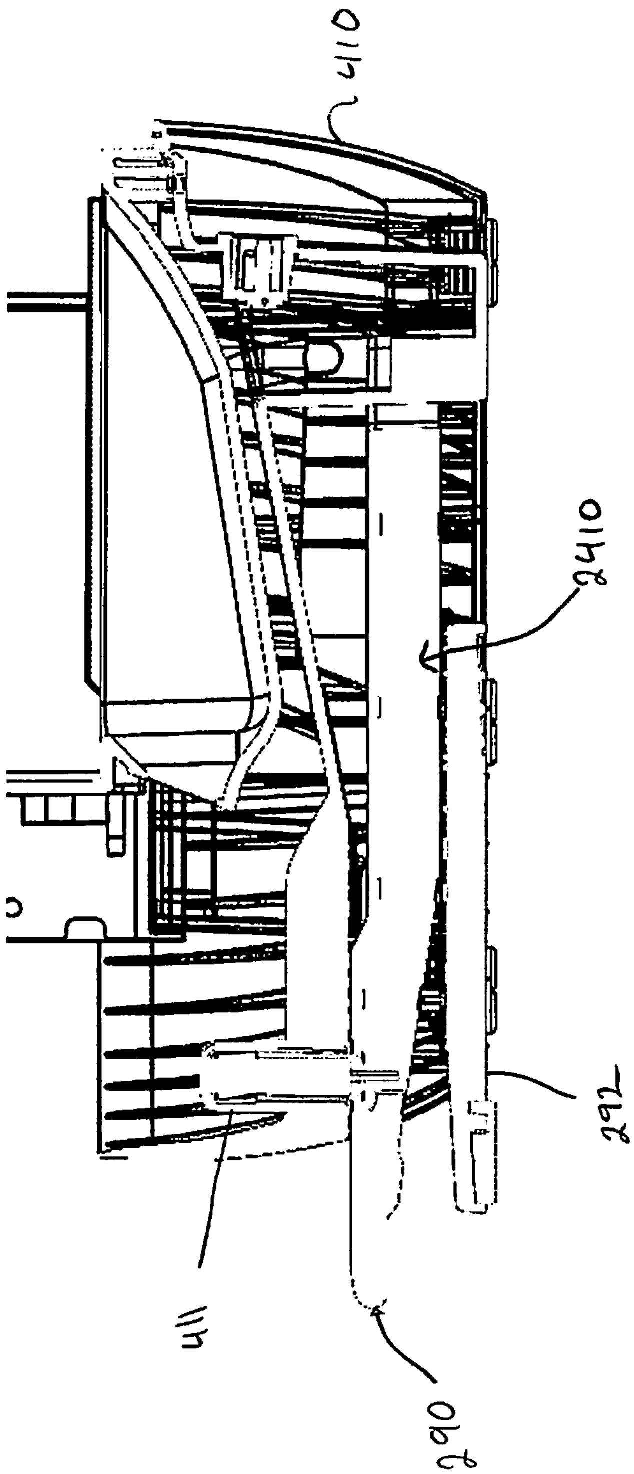


FIG. 24A

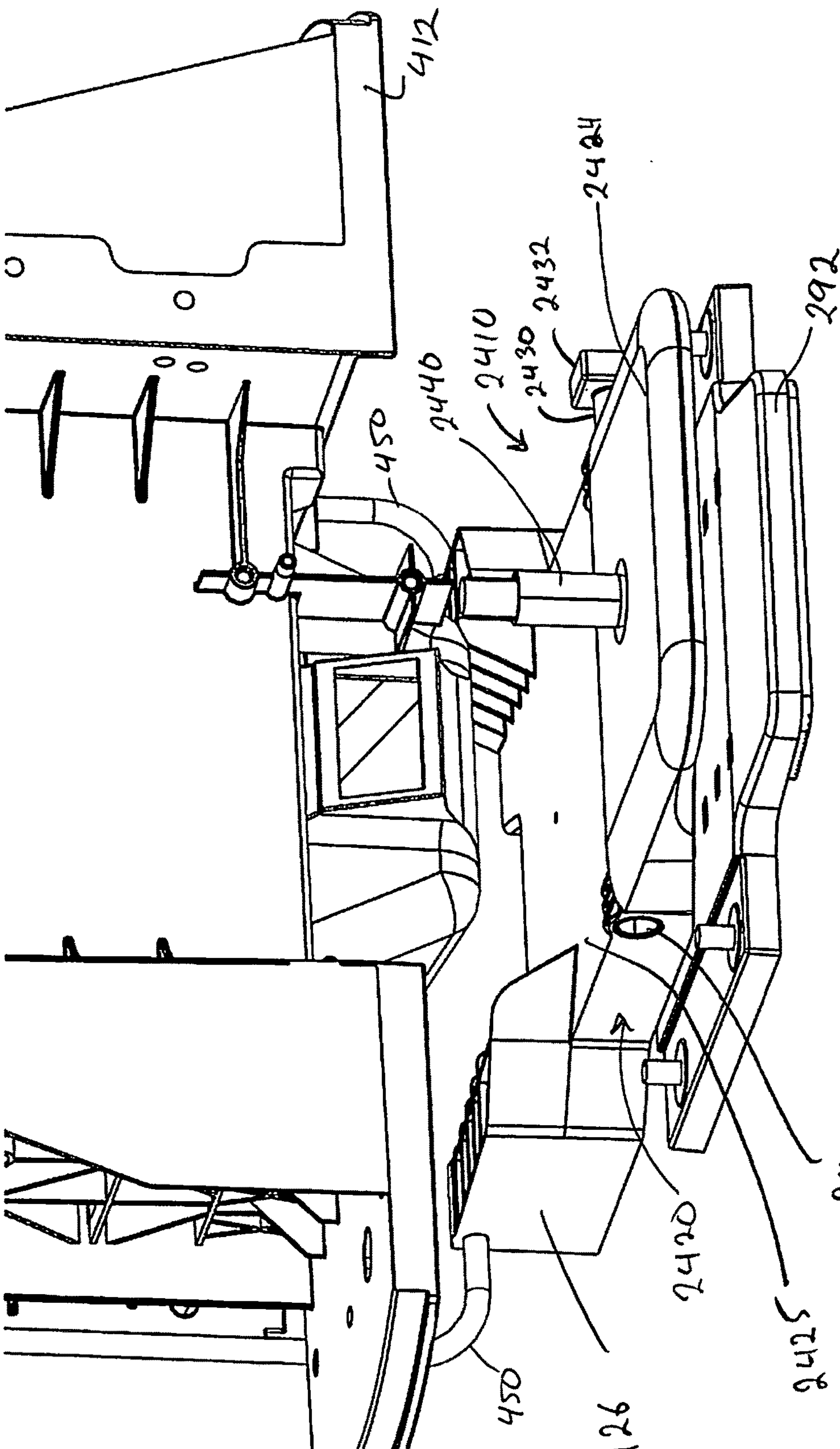


FIG. 24B

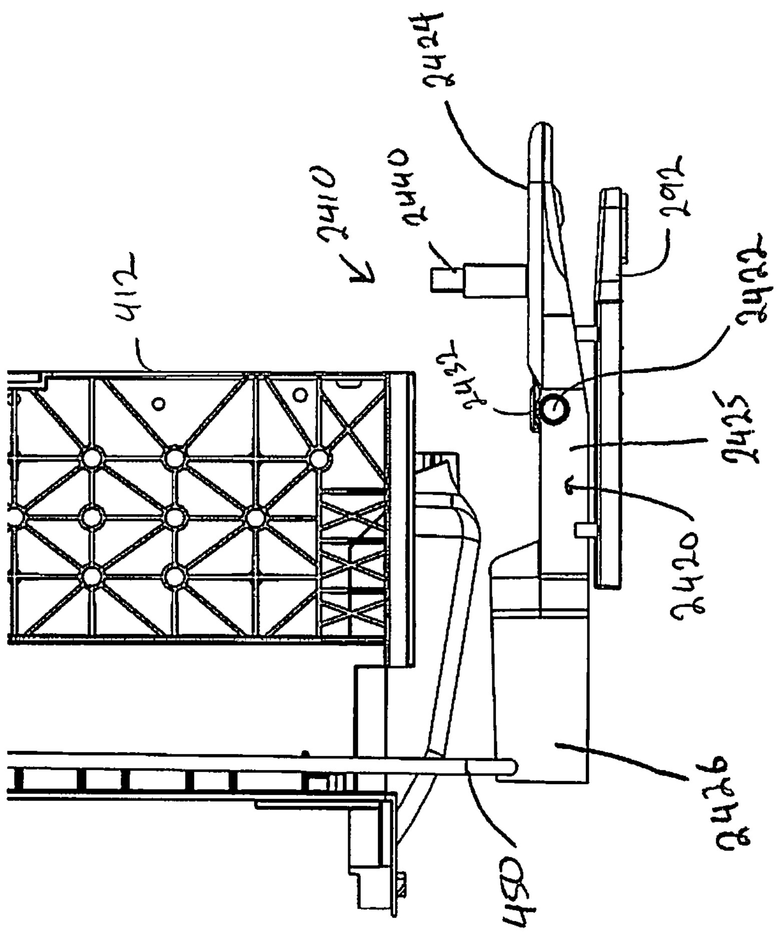


FIG. 24C

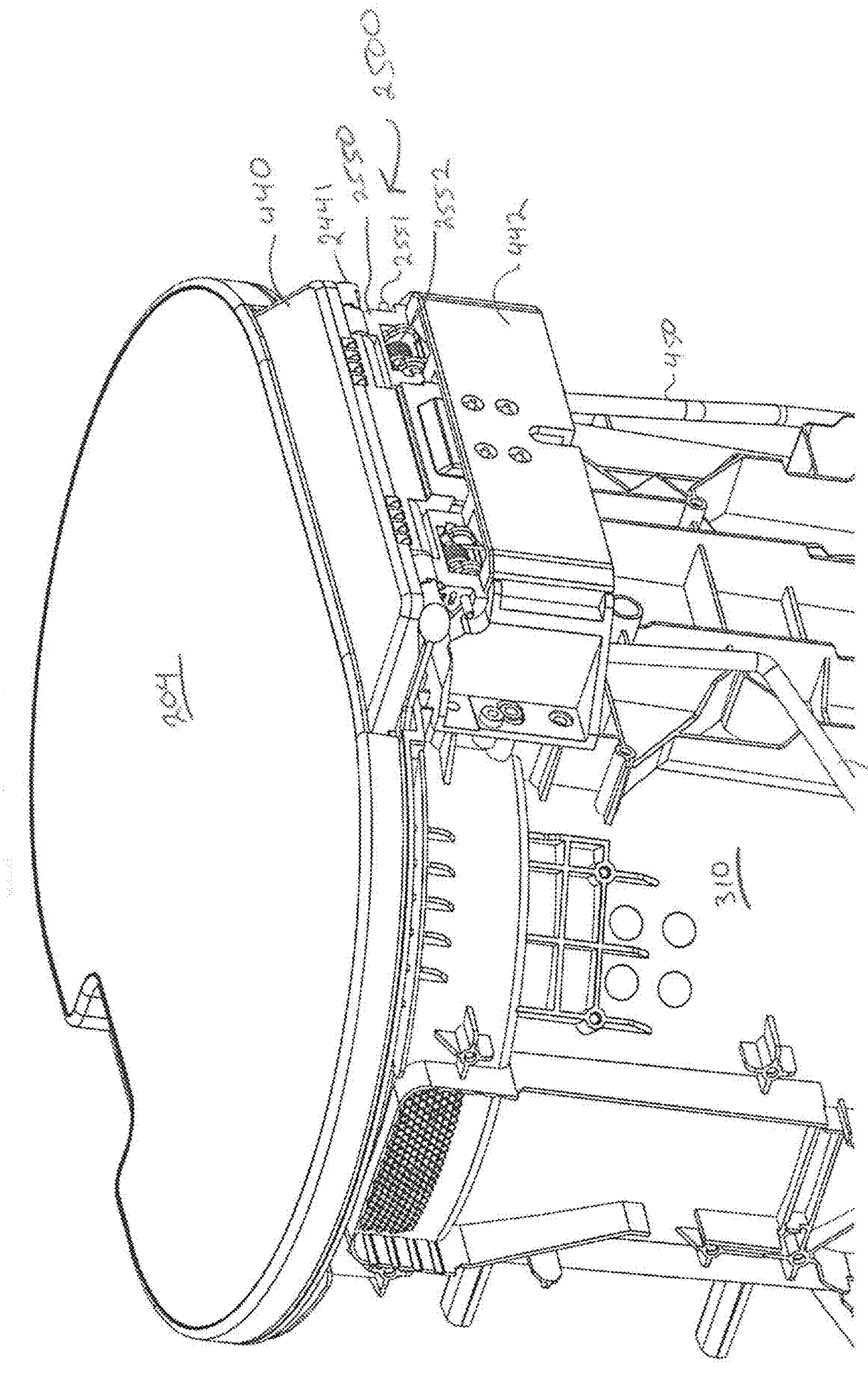


FIG. 25A

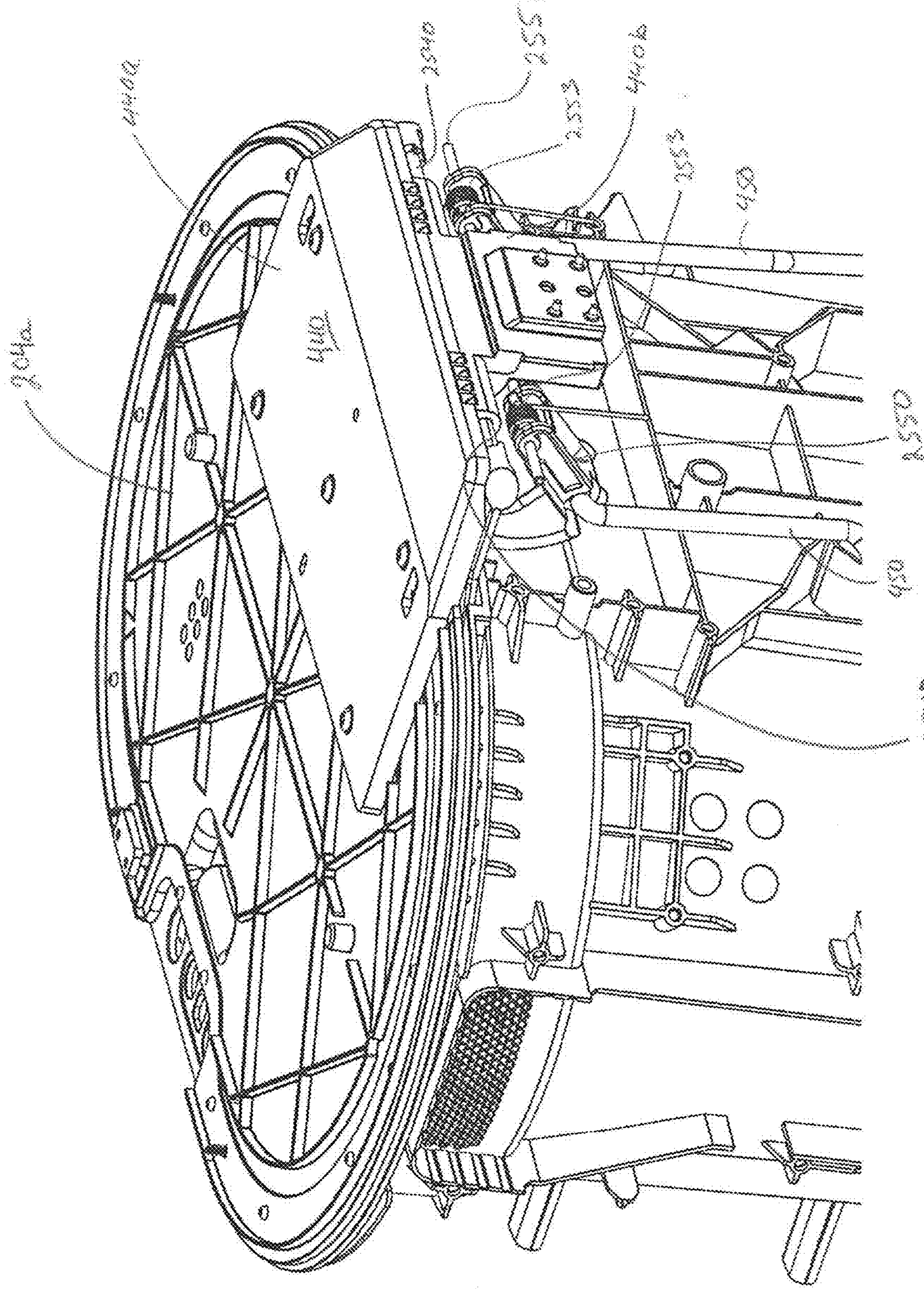


FIG. 25B

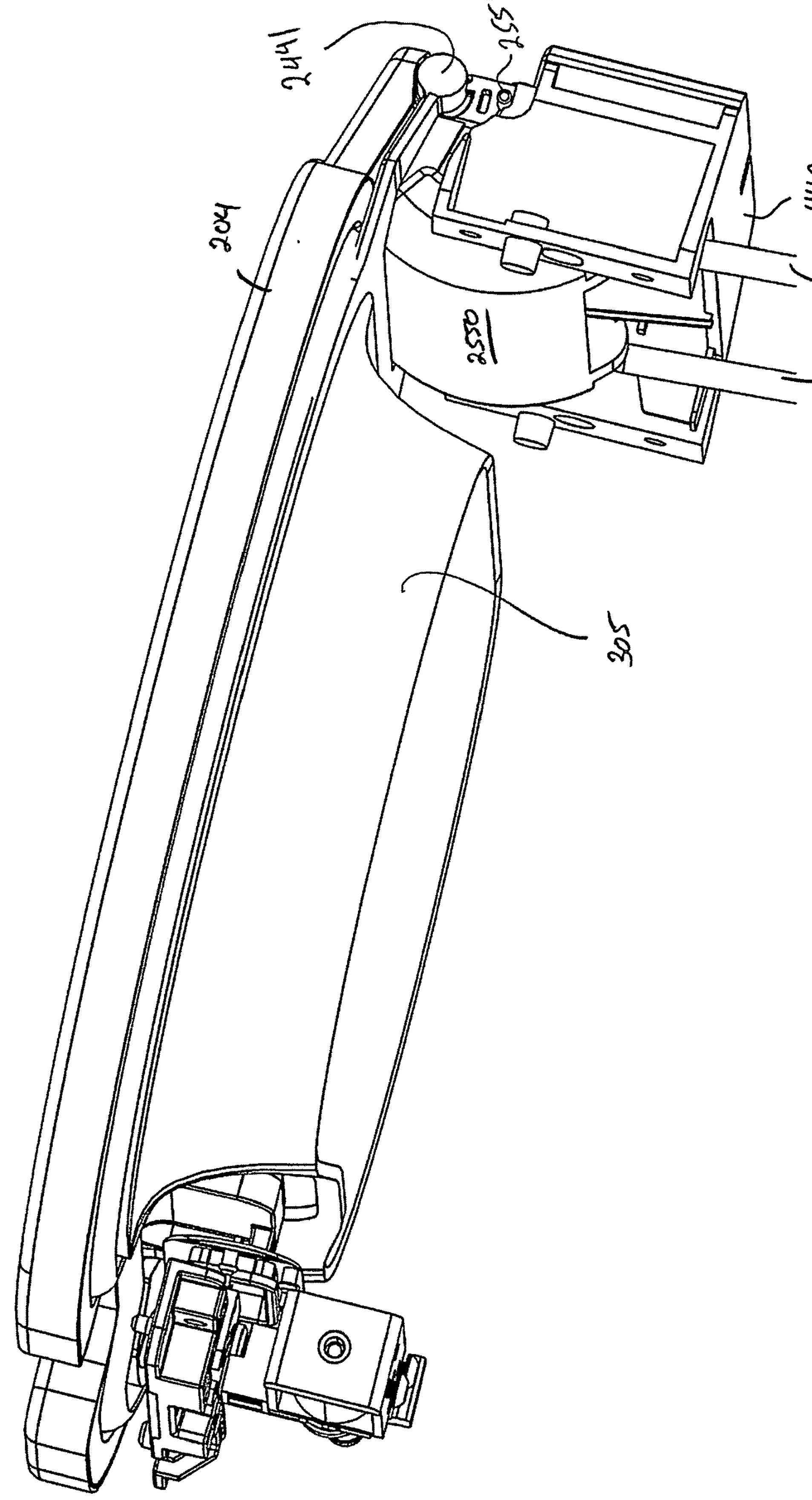


FIG. 25C

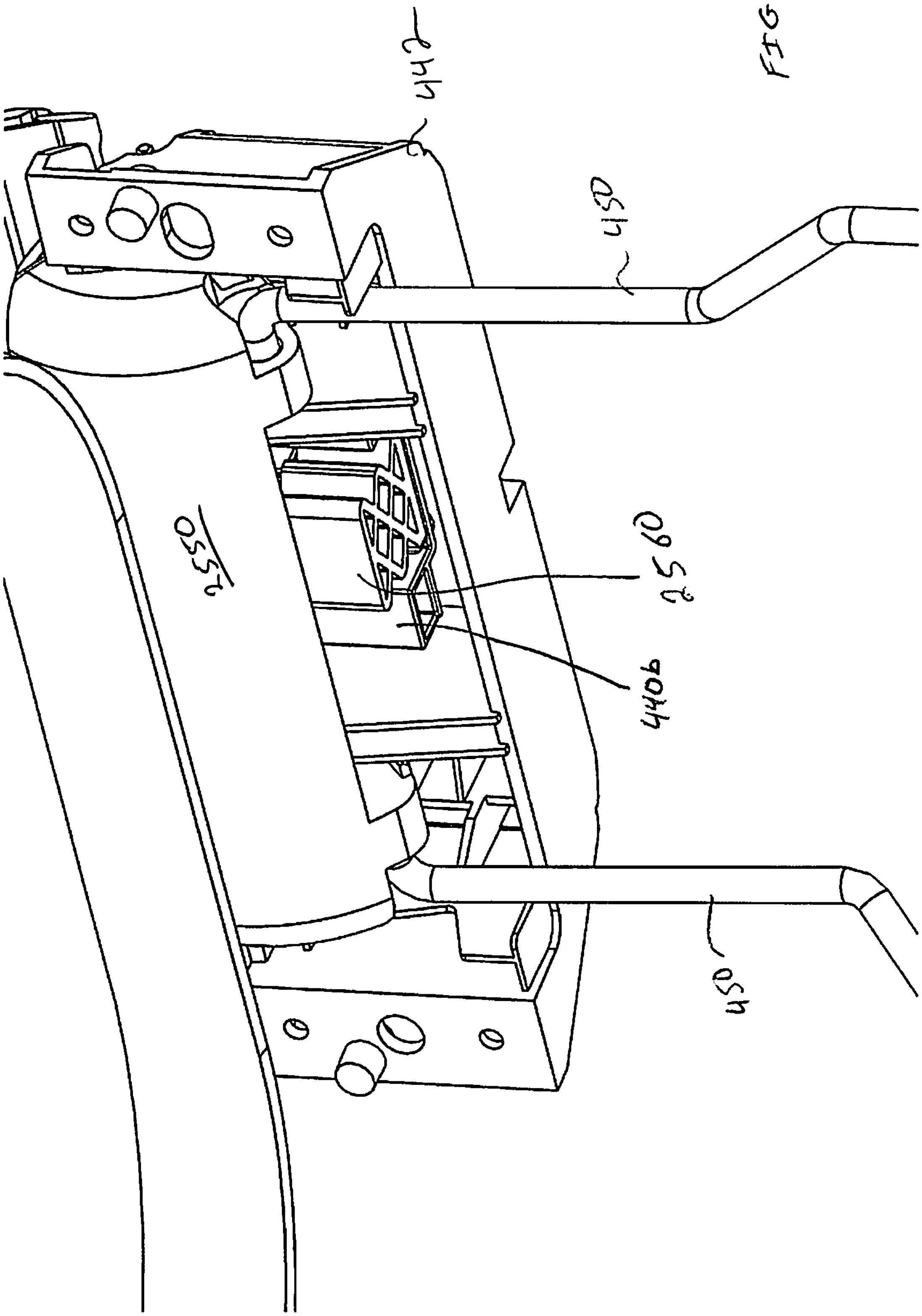


FIG. 25D

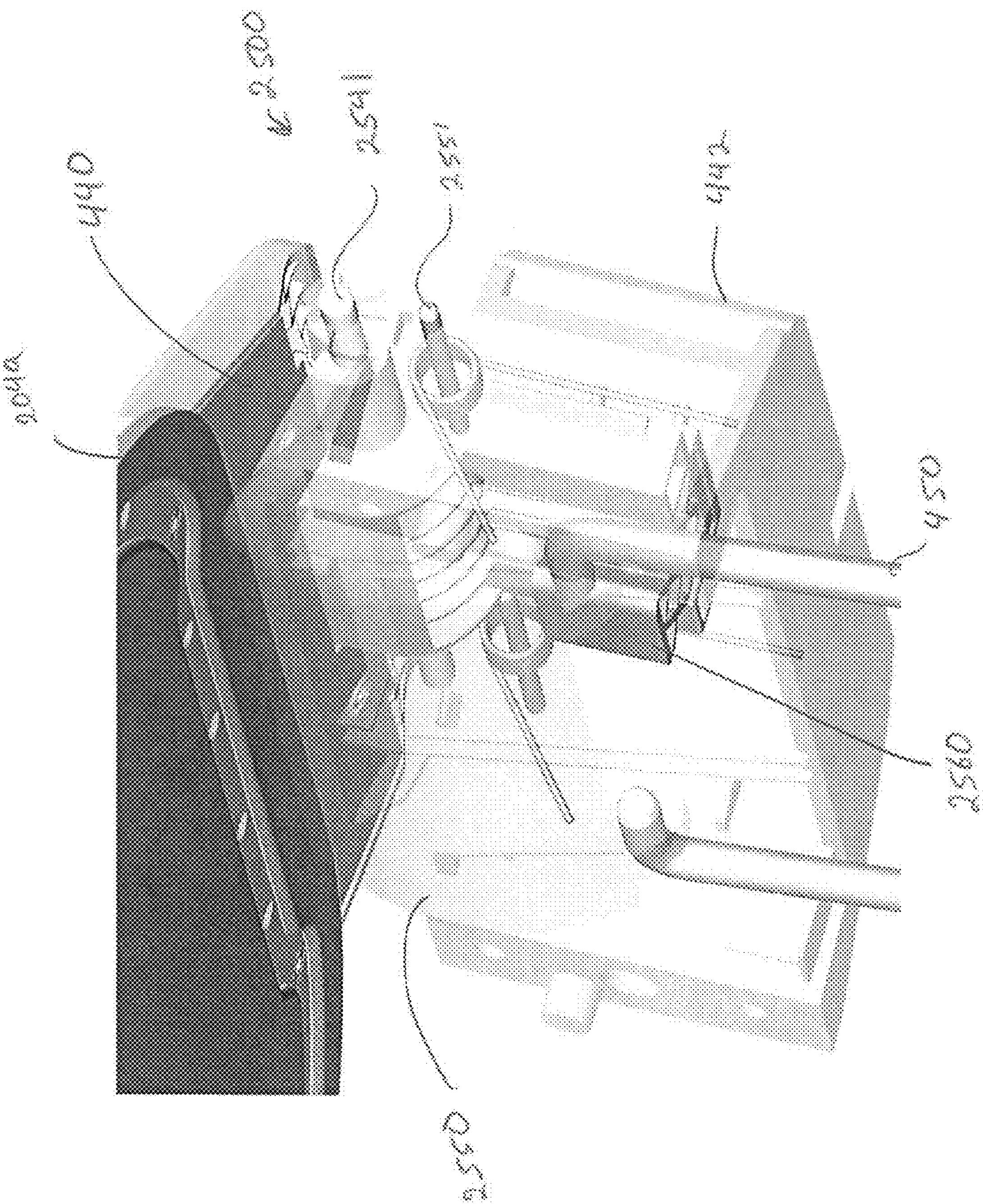


FIG. 25E

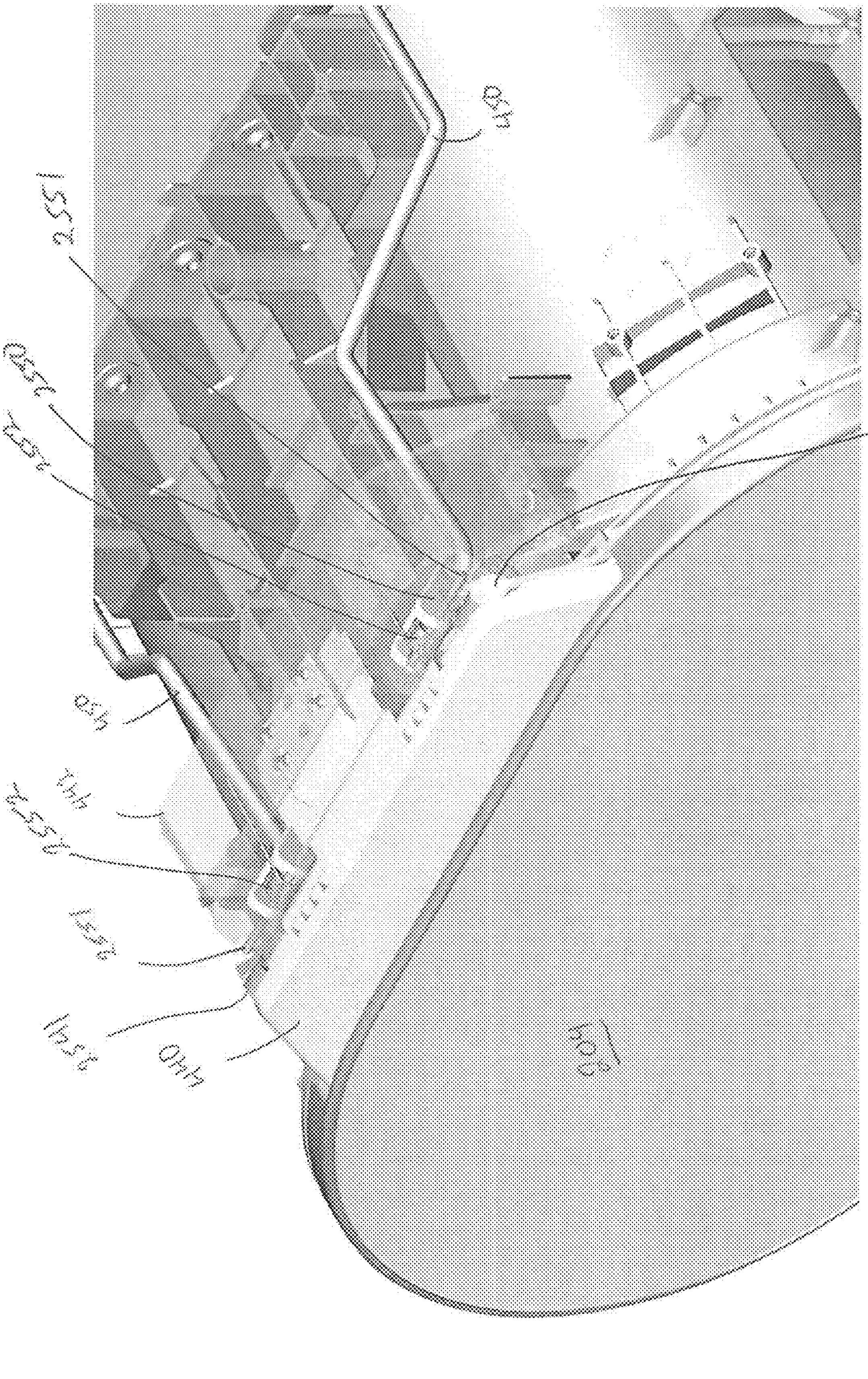


FIG. 25F

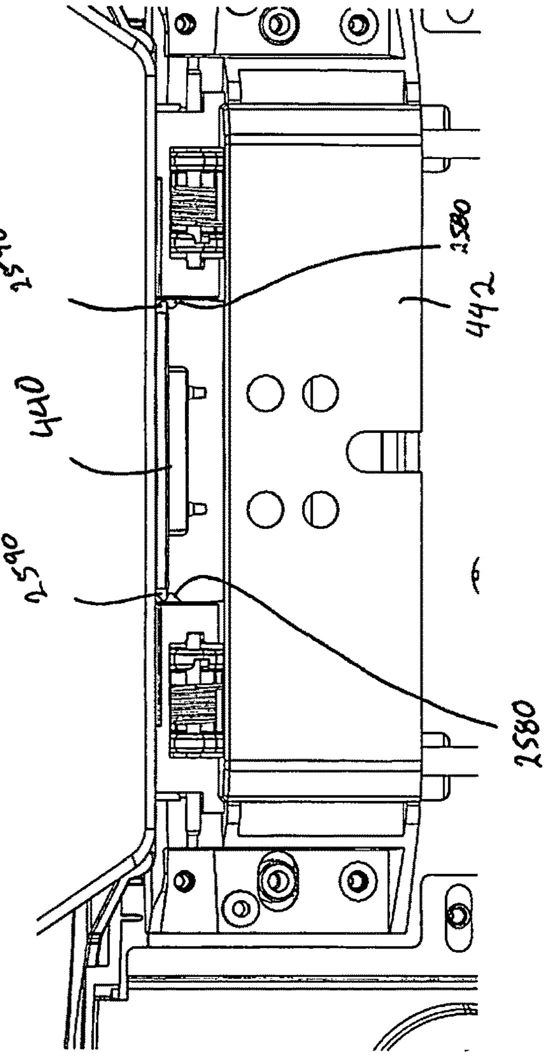


FIG. 25G

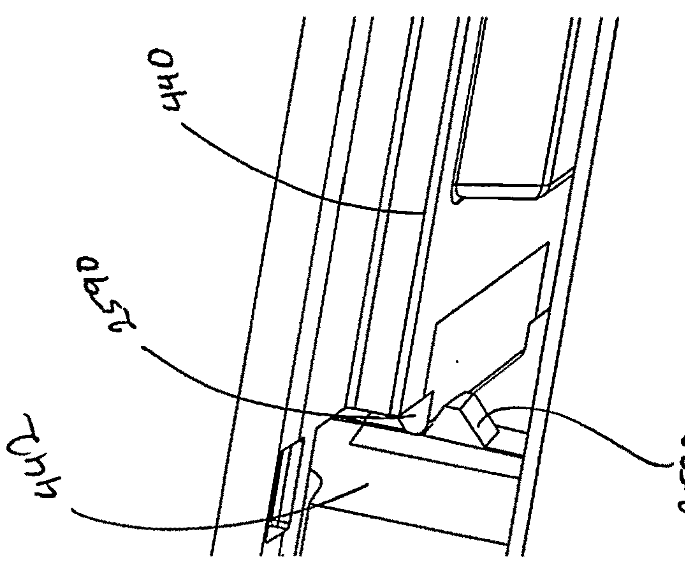


FIG. 25H

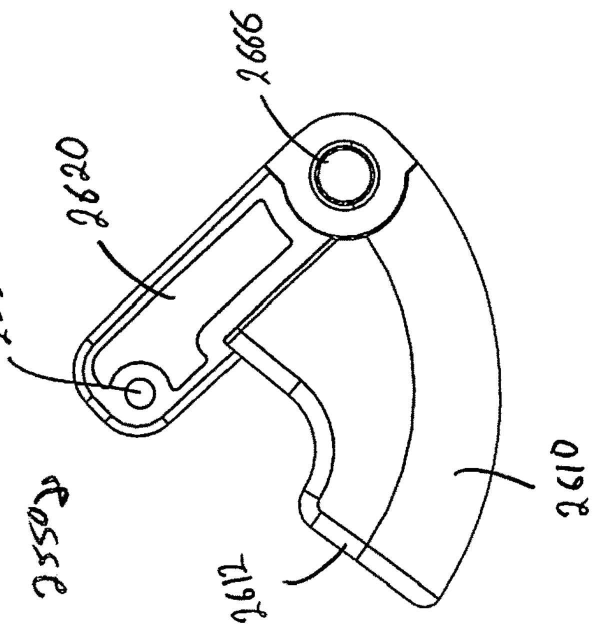


FIG. 26C

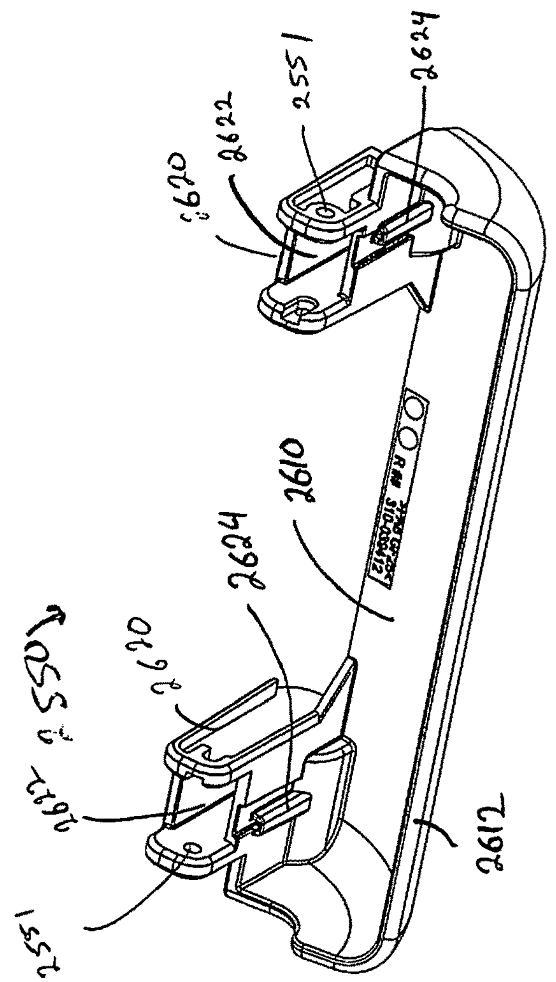


FIG. 26A

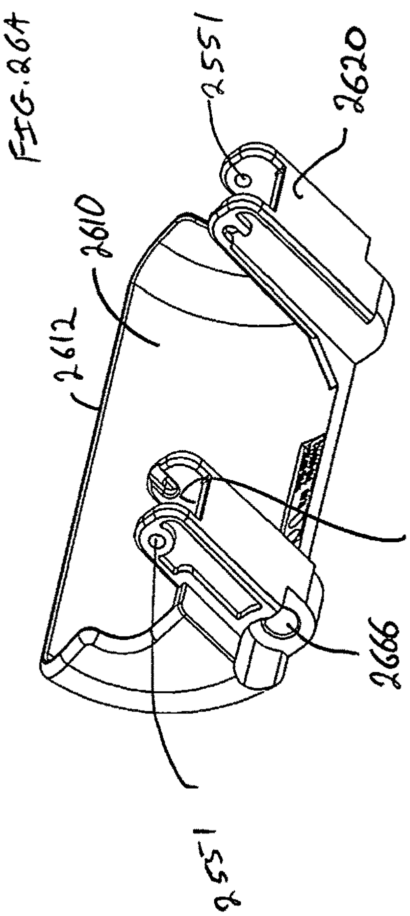


FIG. 26B

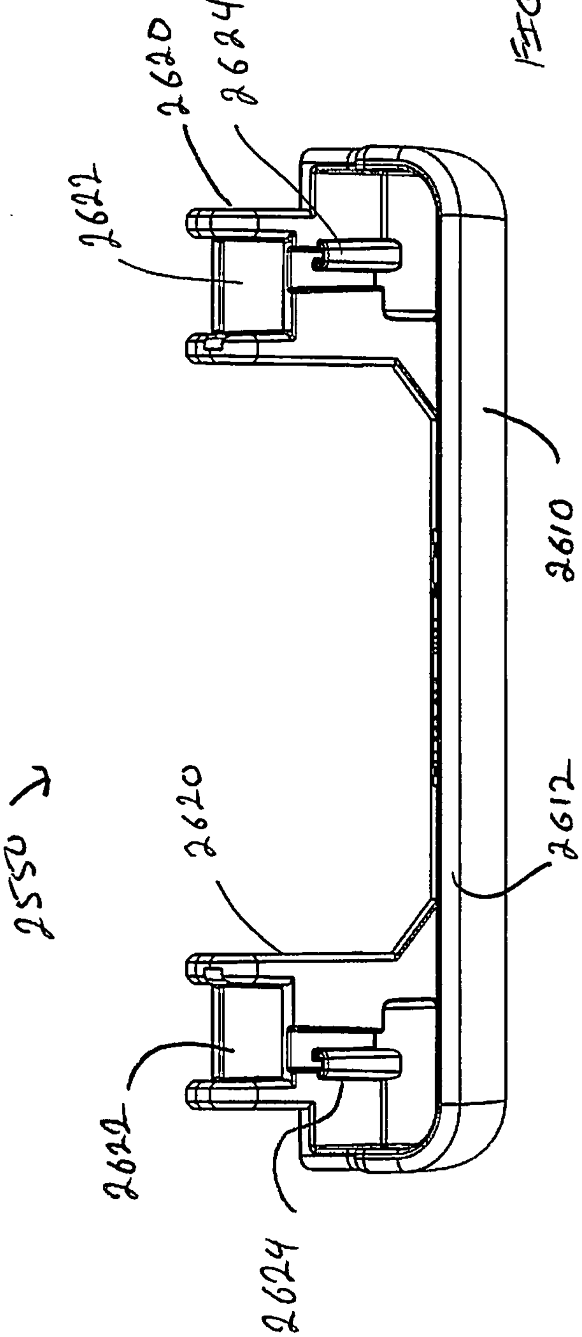


FIG-26D

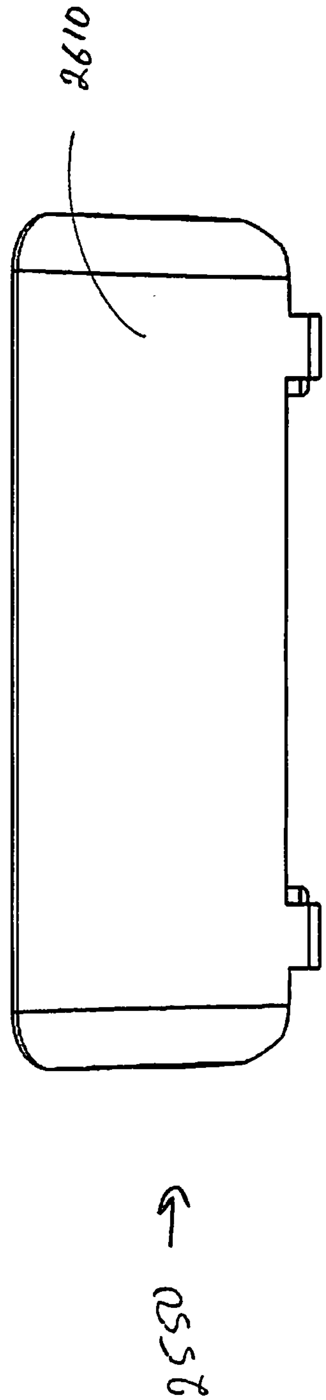


FIG 26E

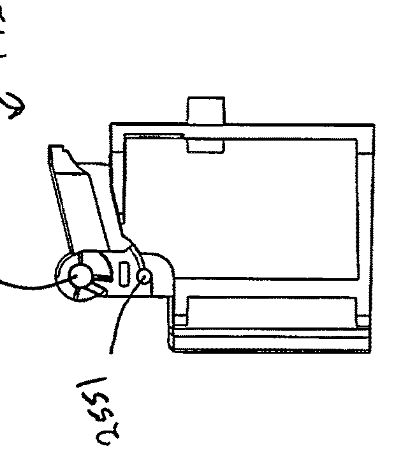


FIG. 27C

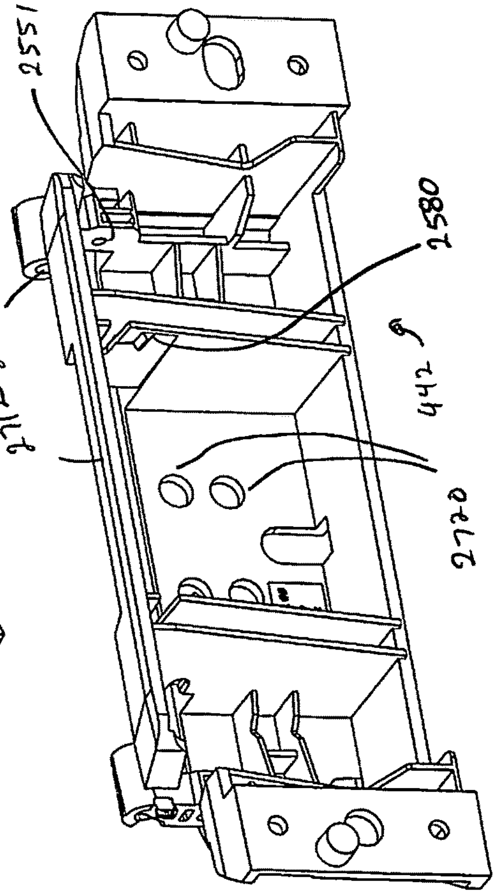


FIG. 27B

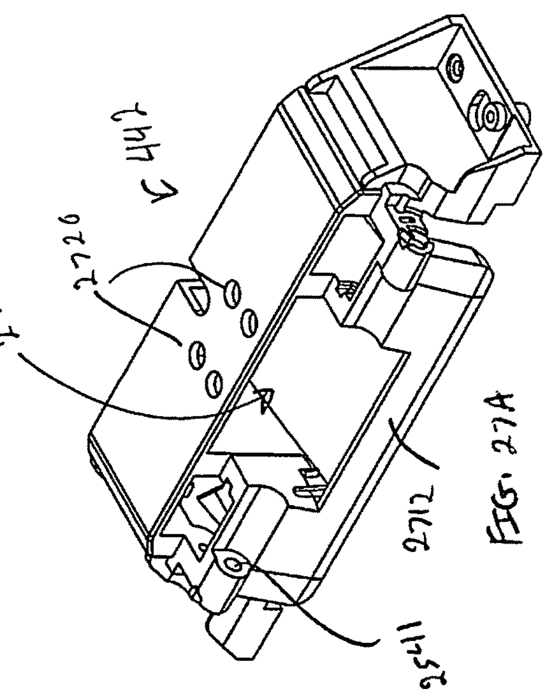


FIG. 27A

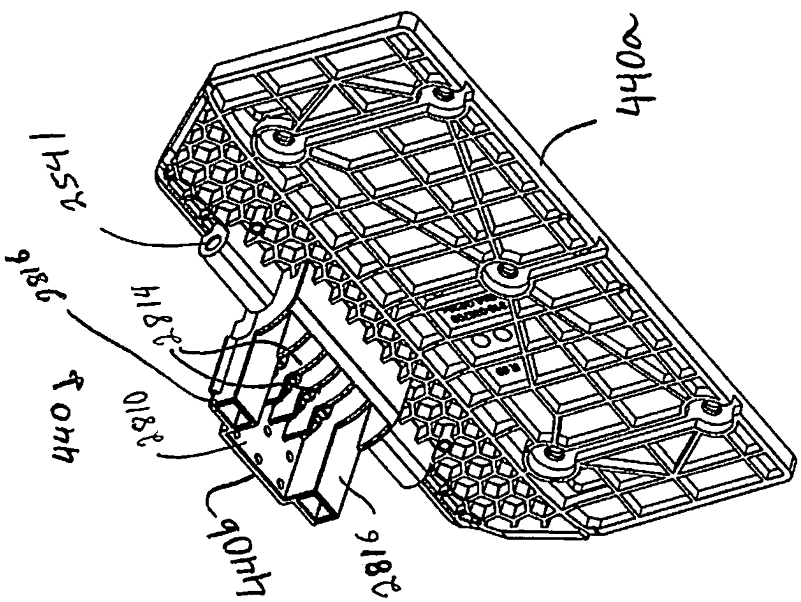


FIG. 28B

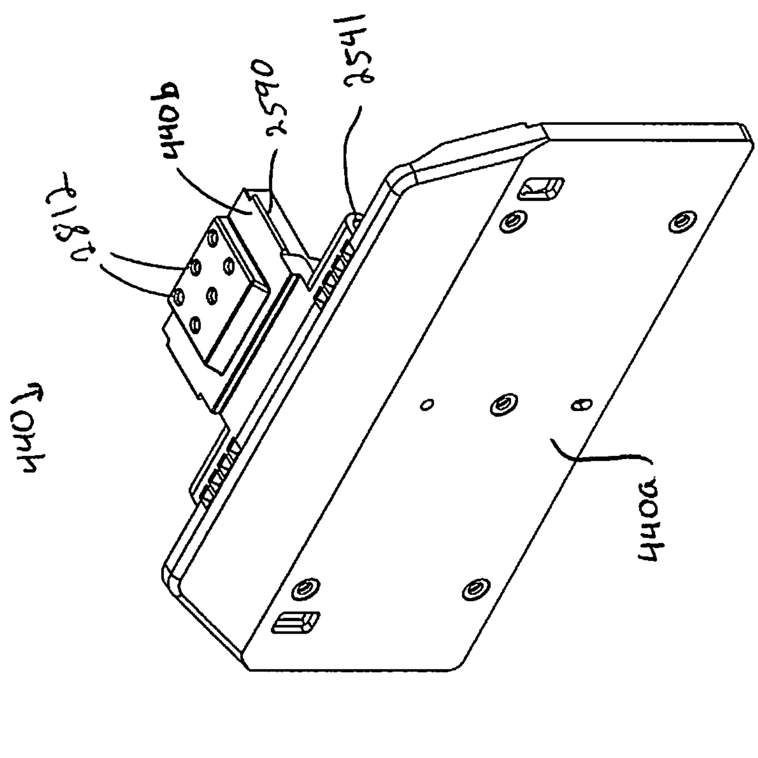


FIG. 28A

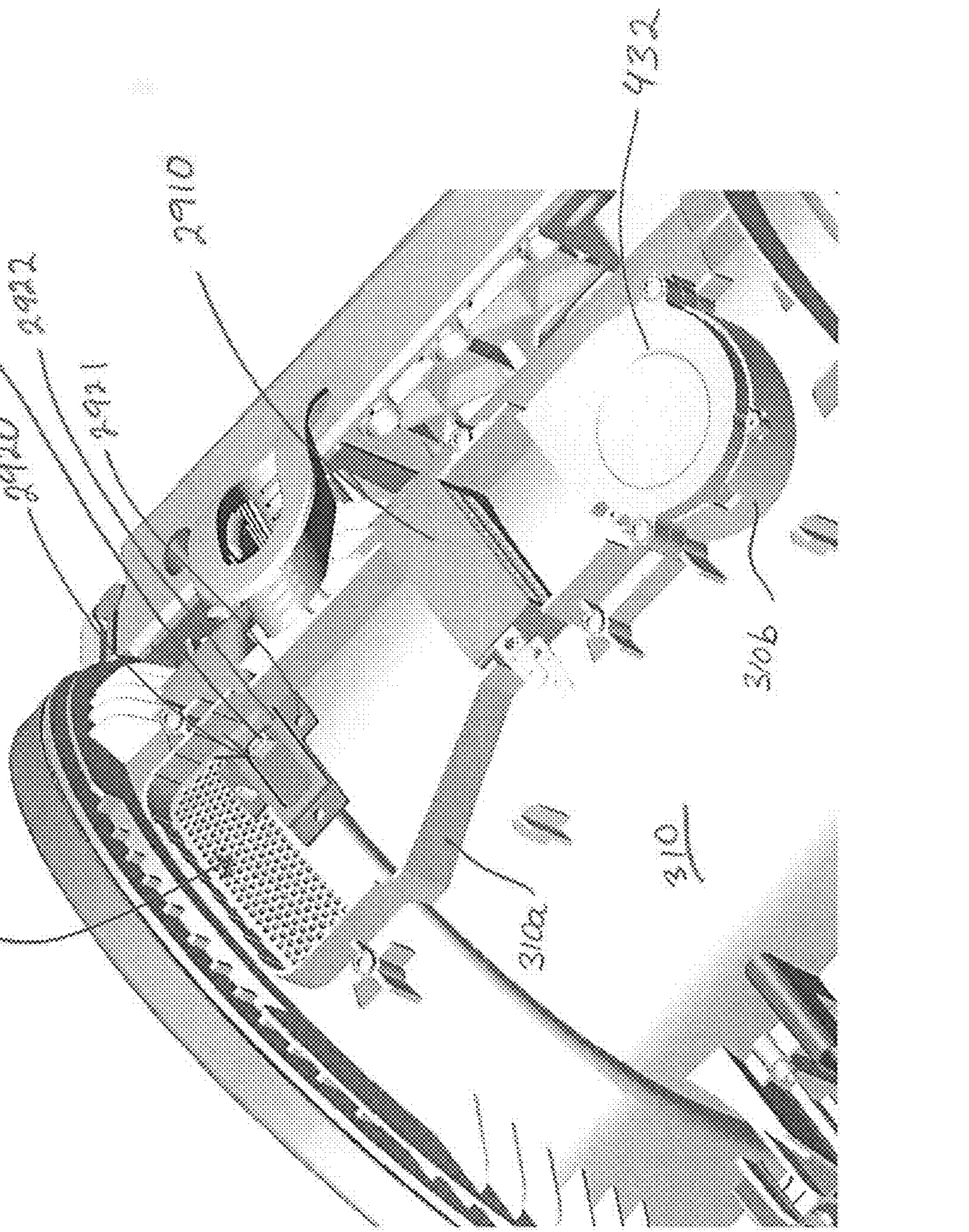


FIG. 29A

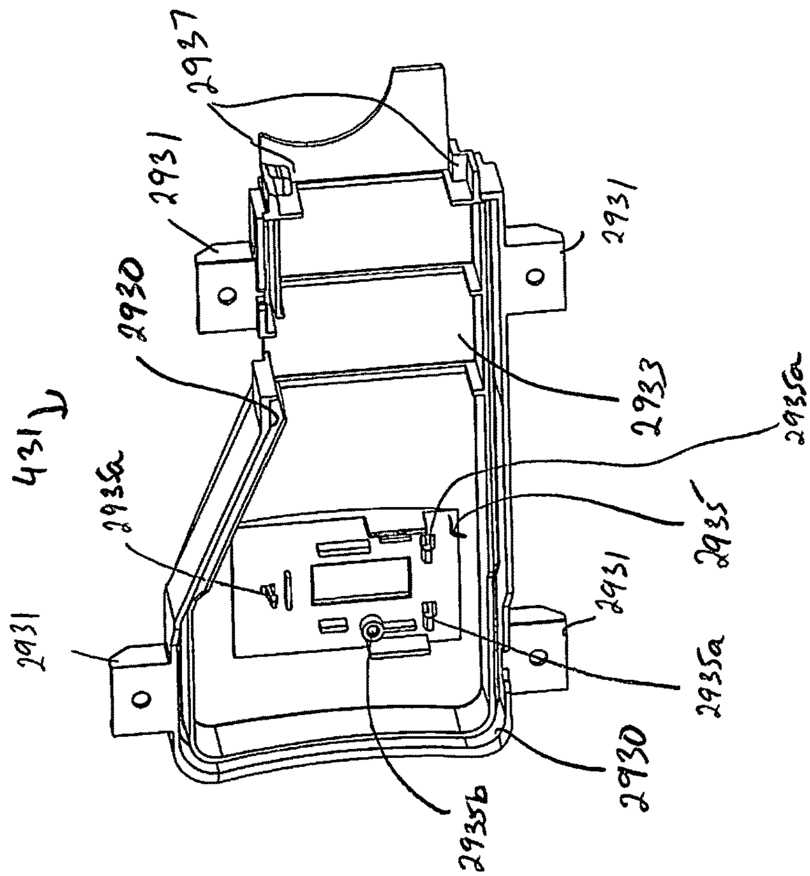


FIG. 29C

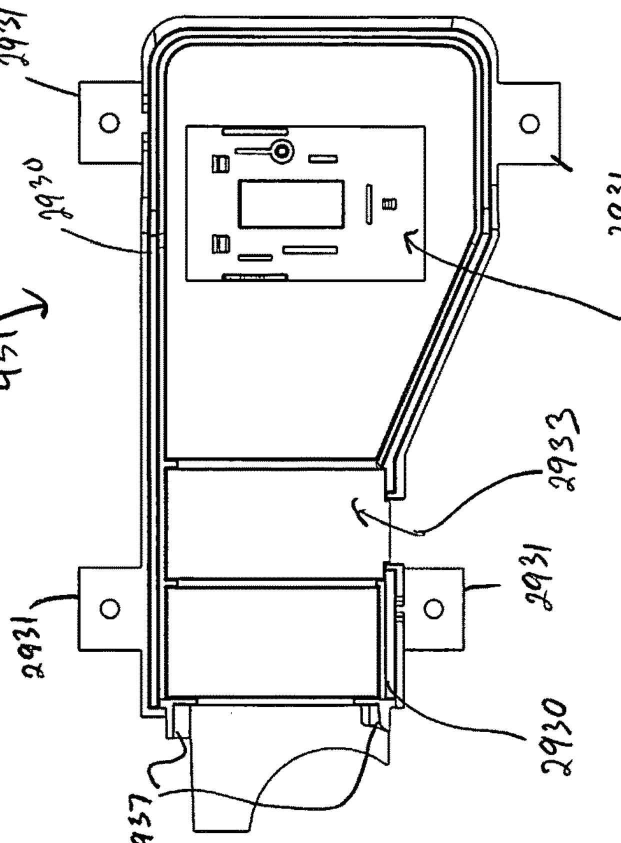


FIG. 29B

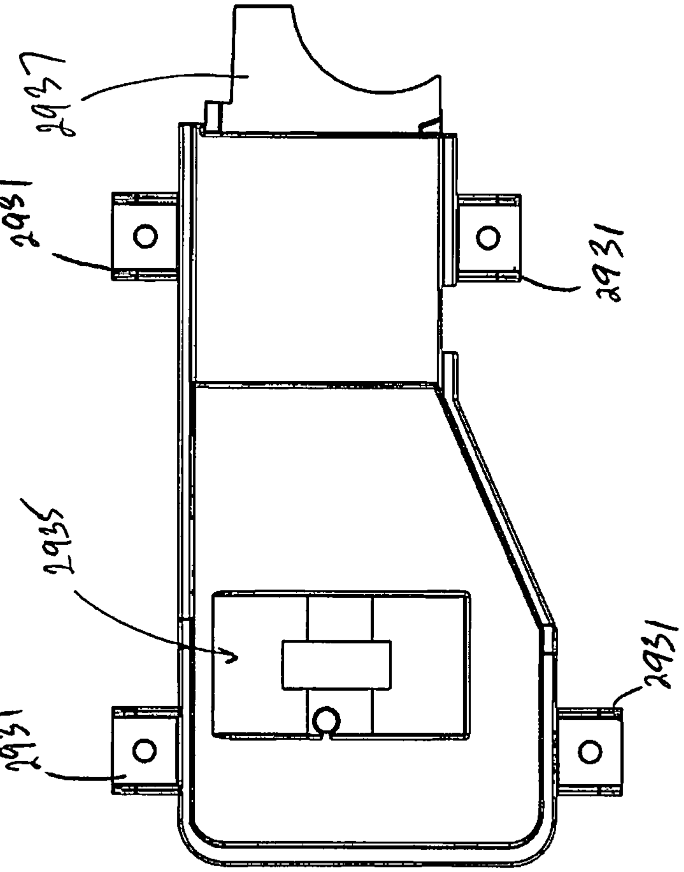


FIG. 29E

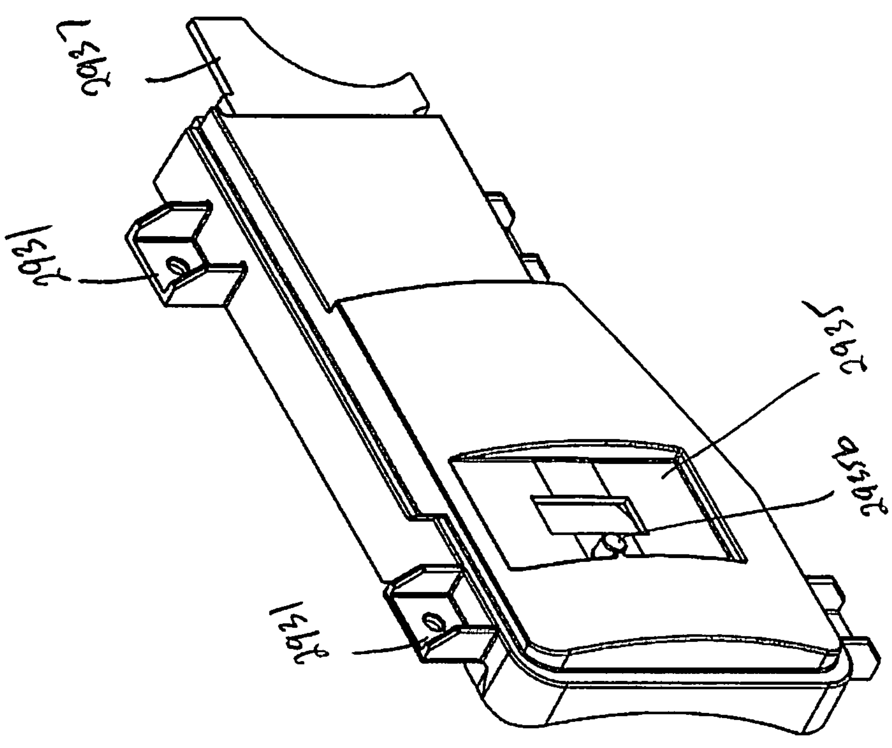


FIG. 29D

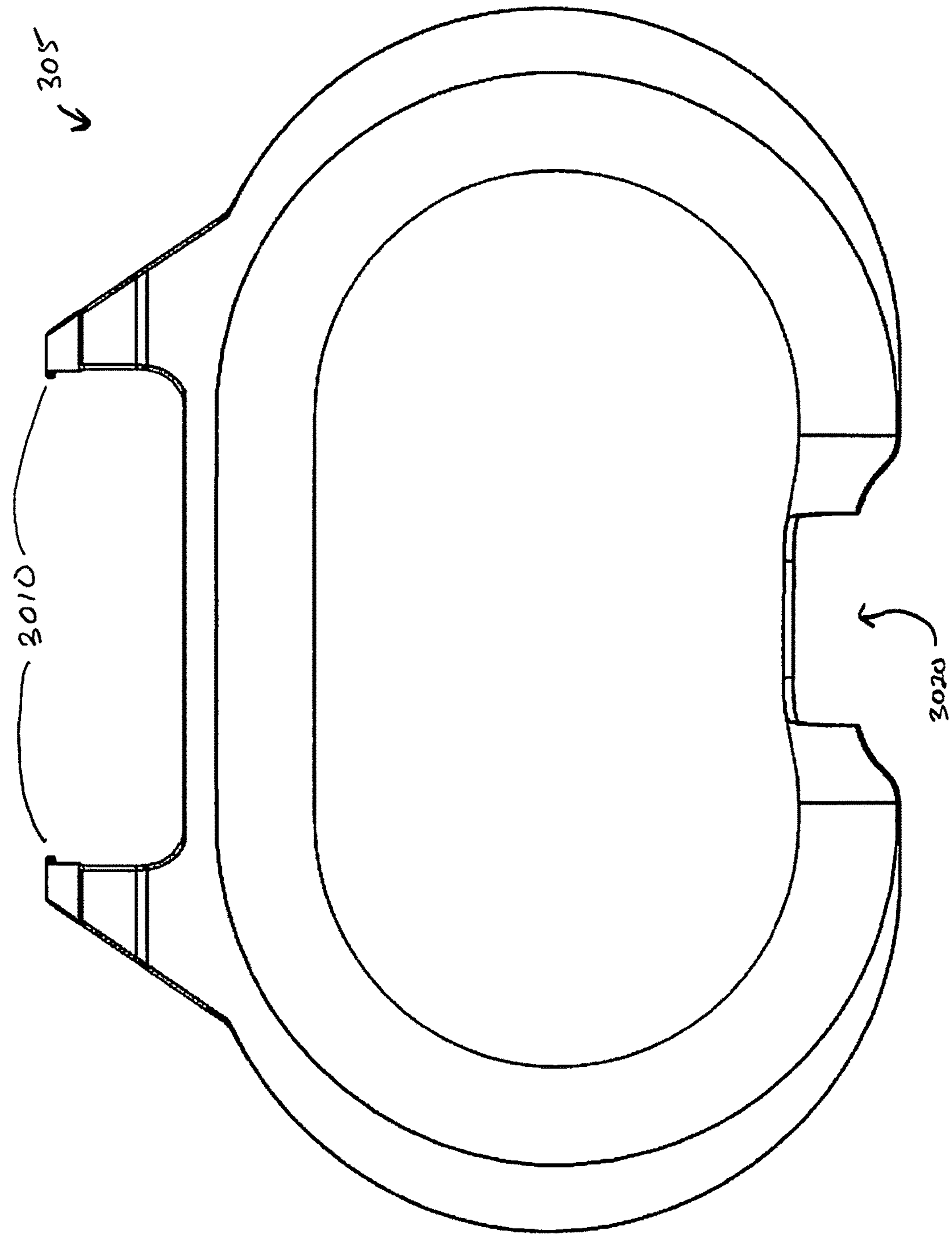


FIG. 30A

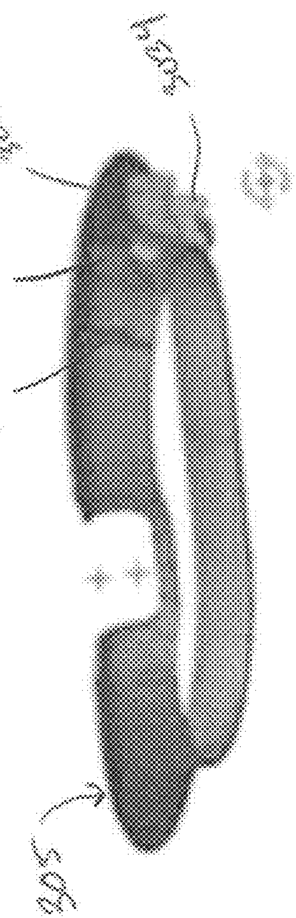


FIG. 30B

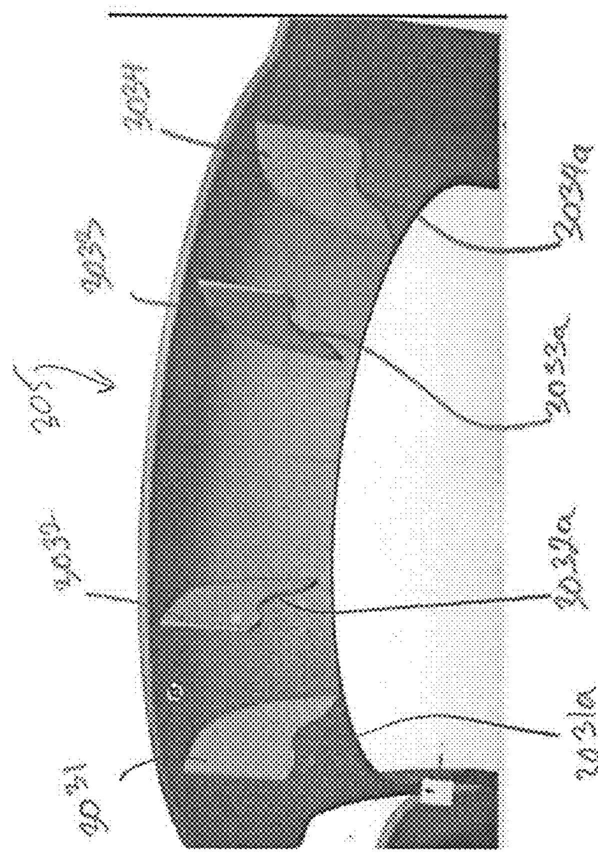


FIG. 30C

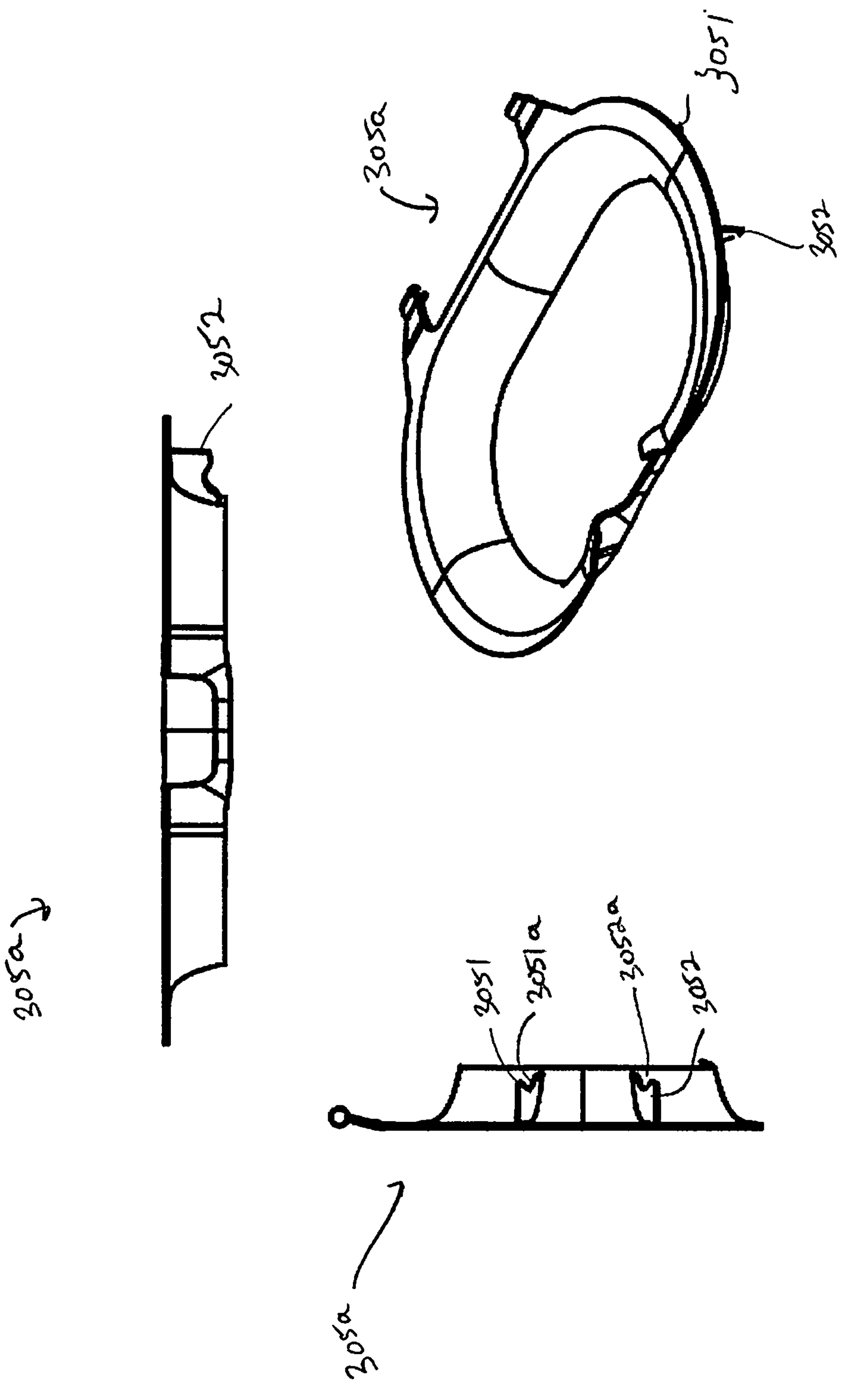


FIG. 30P

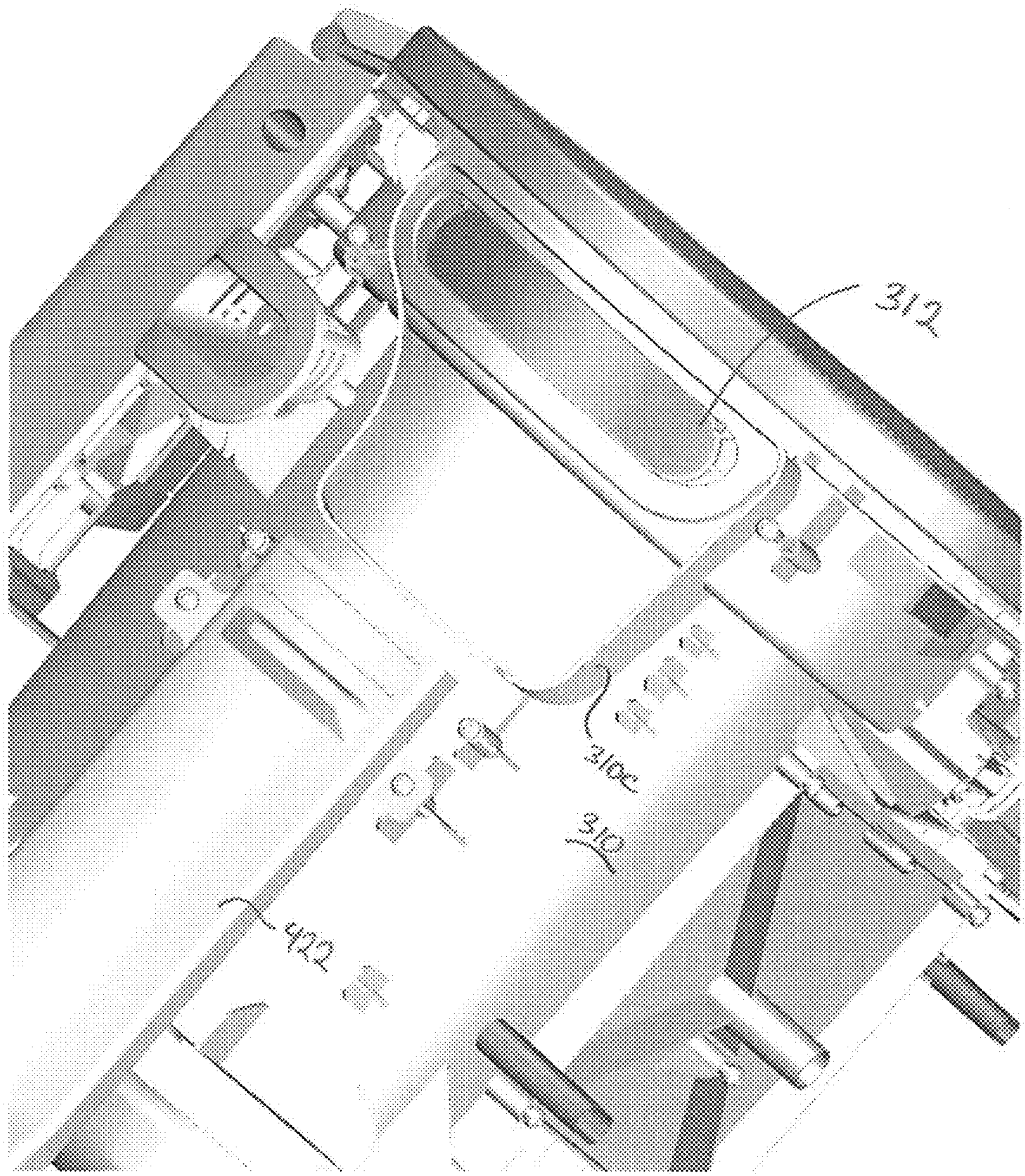


FIG. 31A

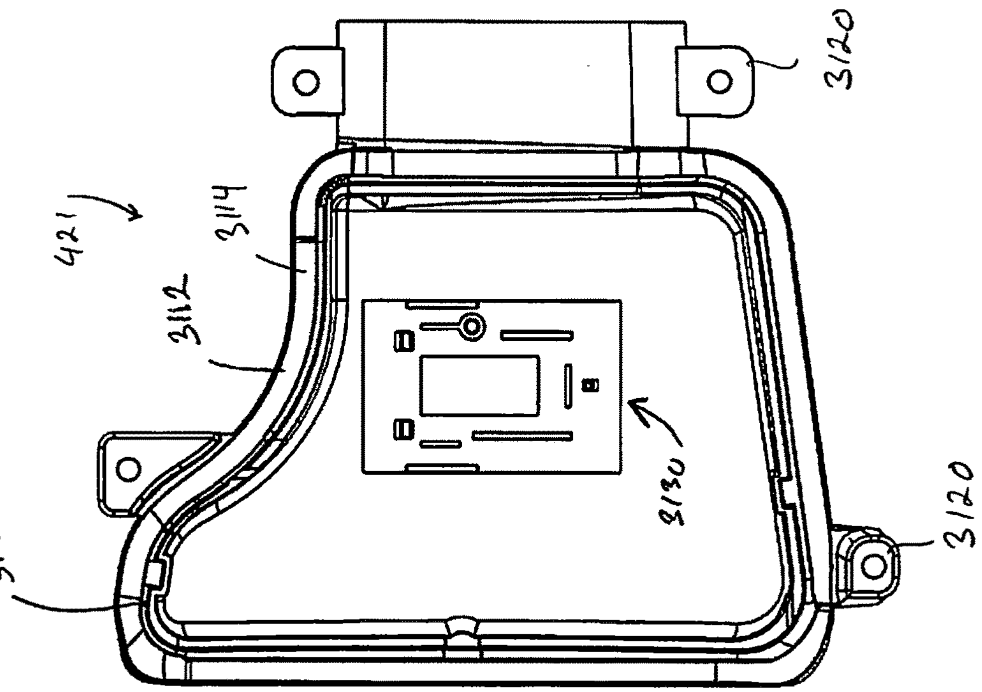


FIG. 31C

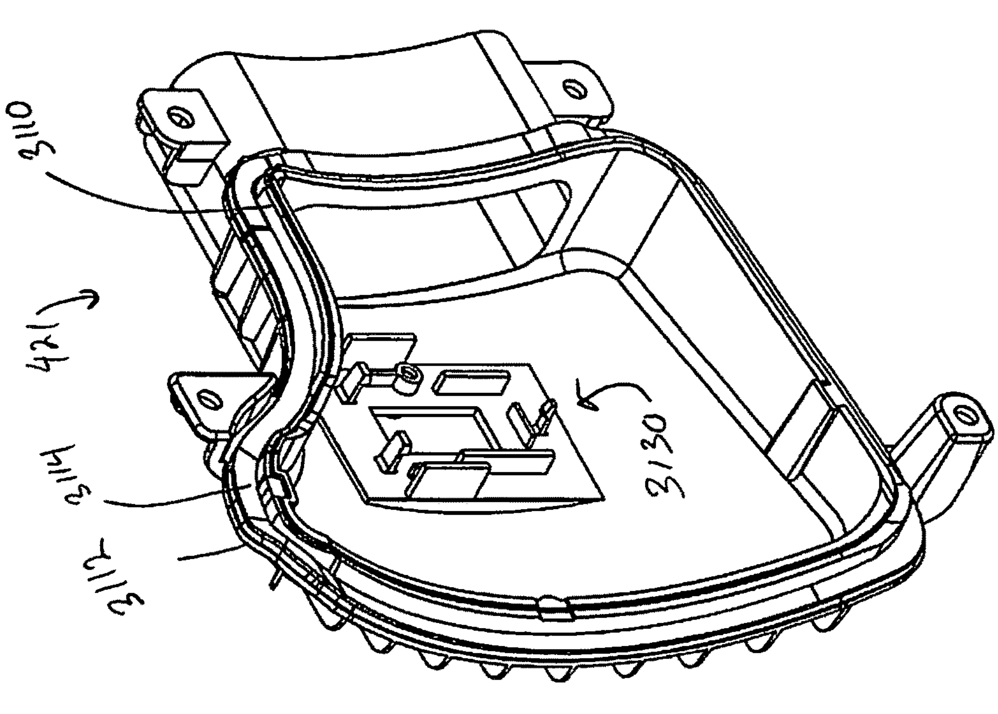


FIG. 31B

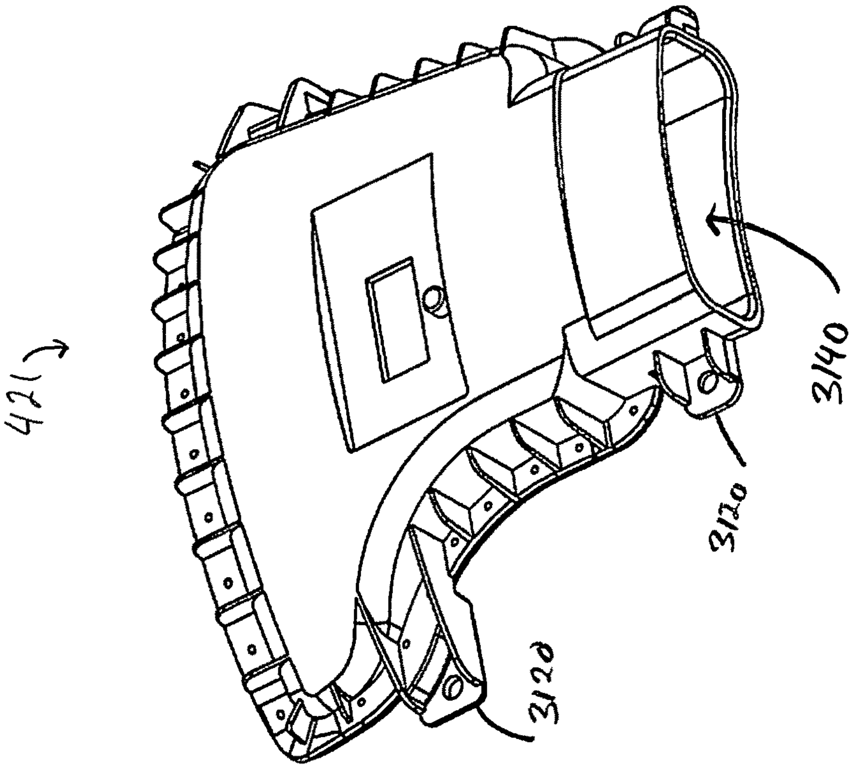


FIG. 31E

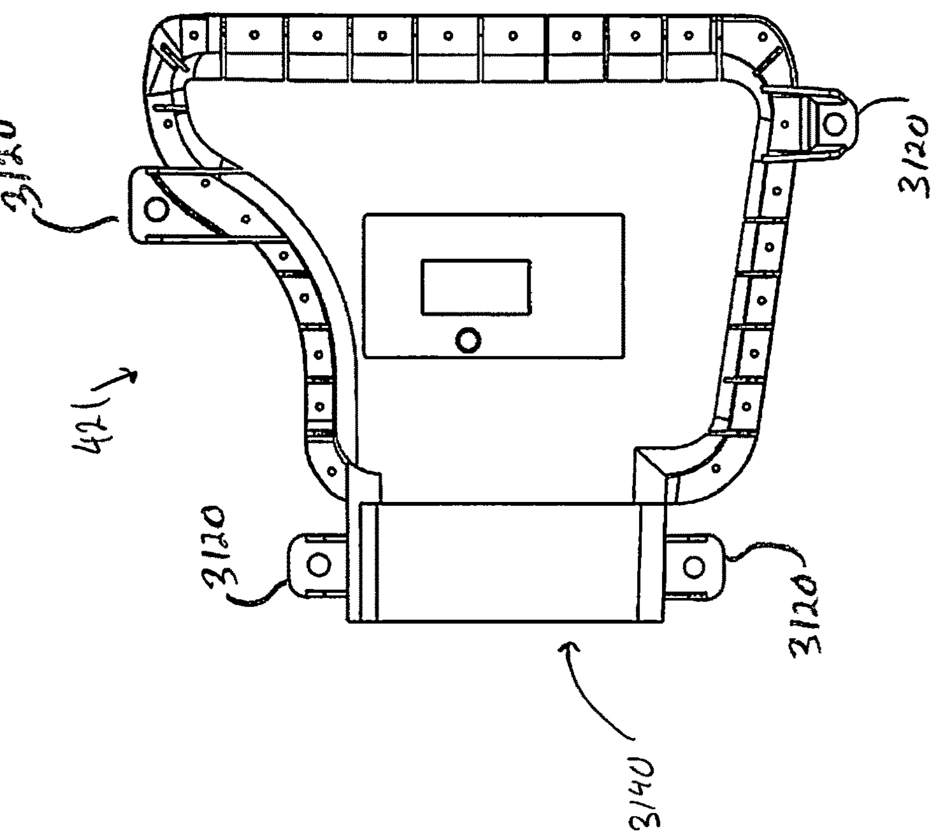


FIG. 31D

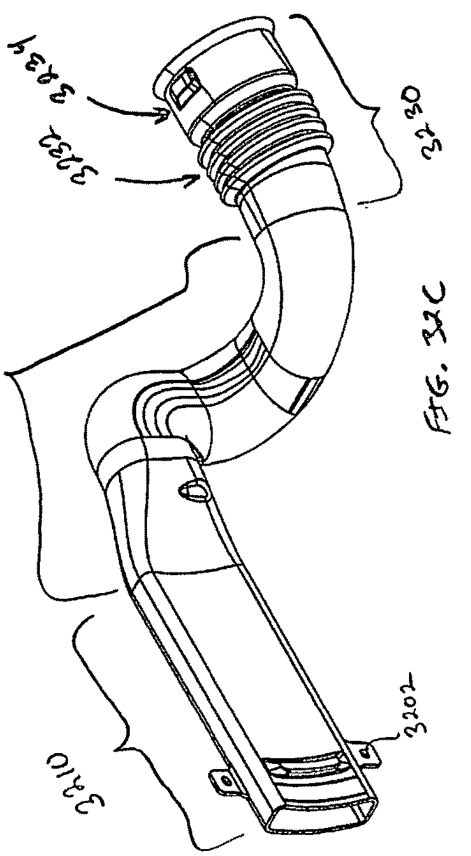


FIG. 32C

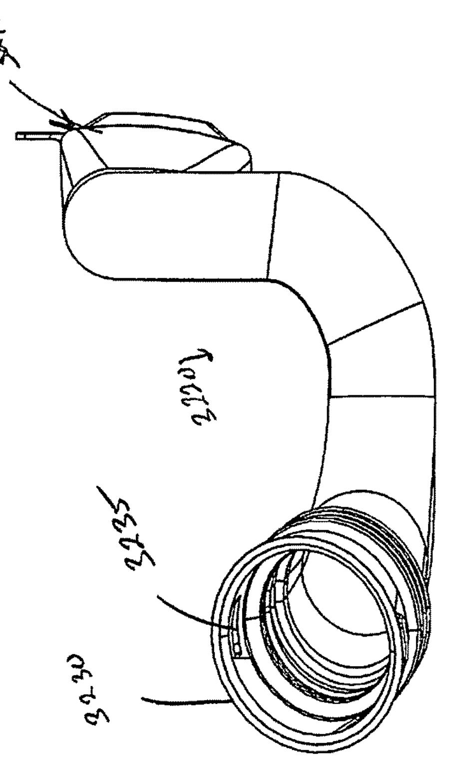


FIG. 32B

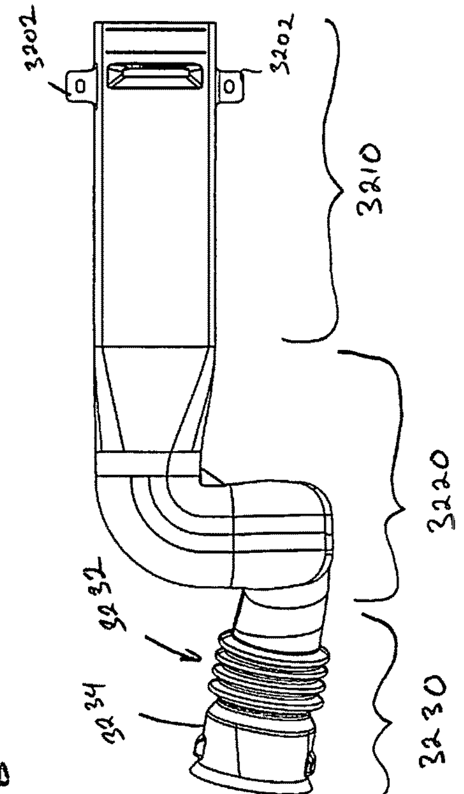


FIG. 32A

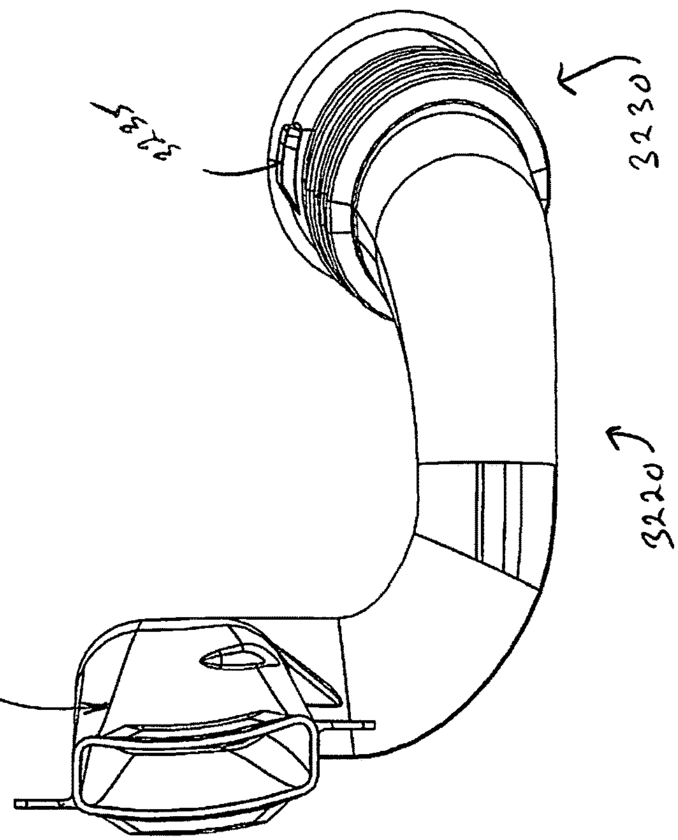


FIG. 32E

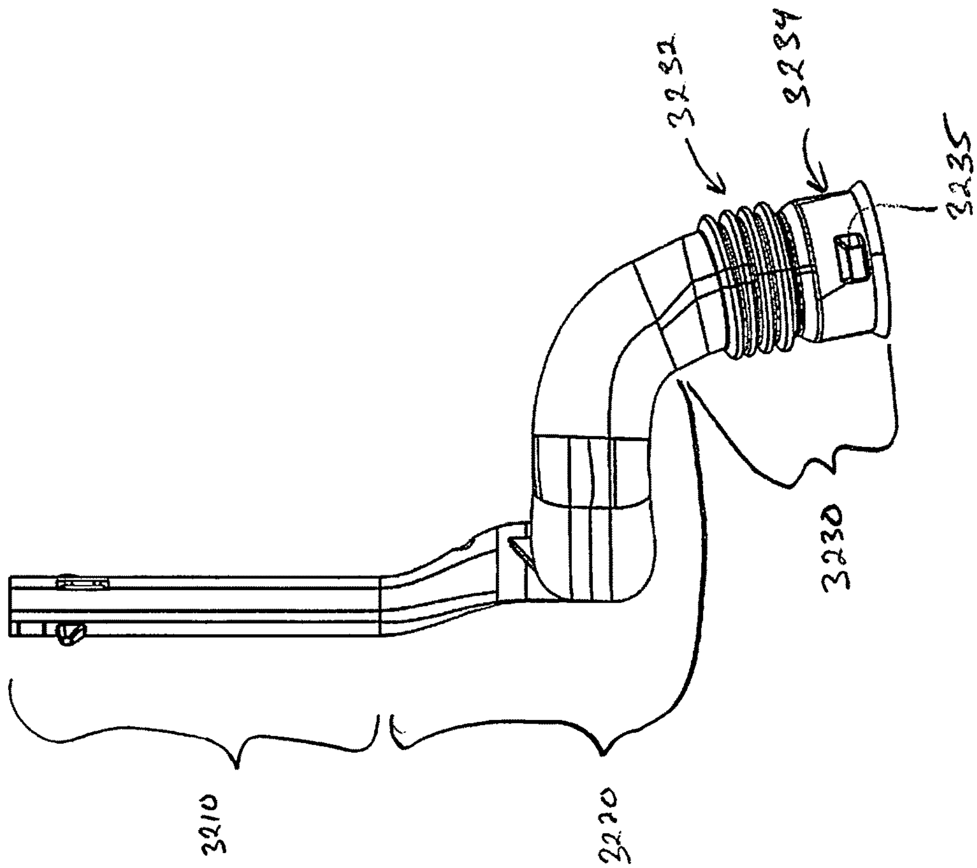


FIG. 32D

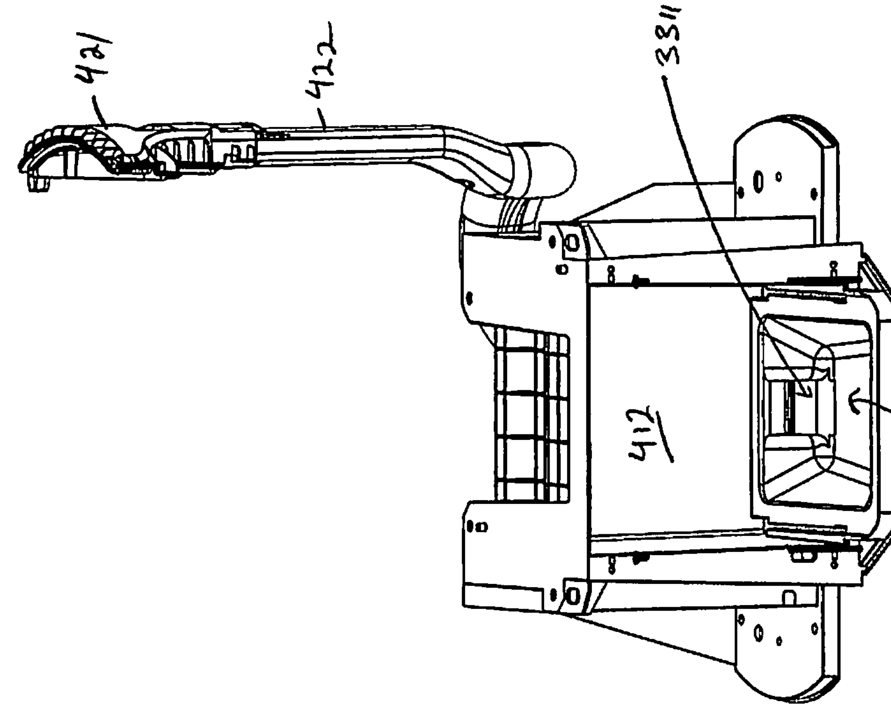


FIG. 33B

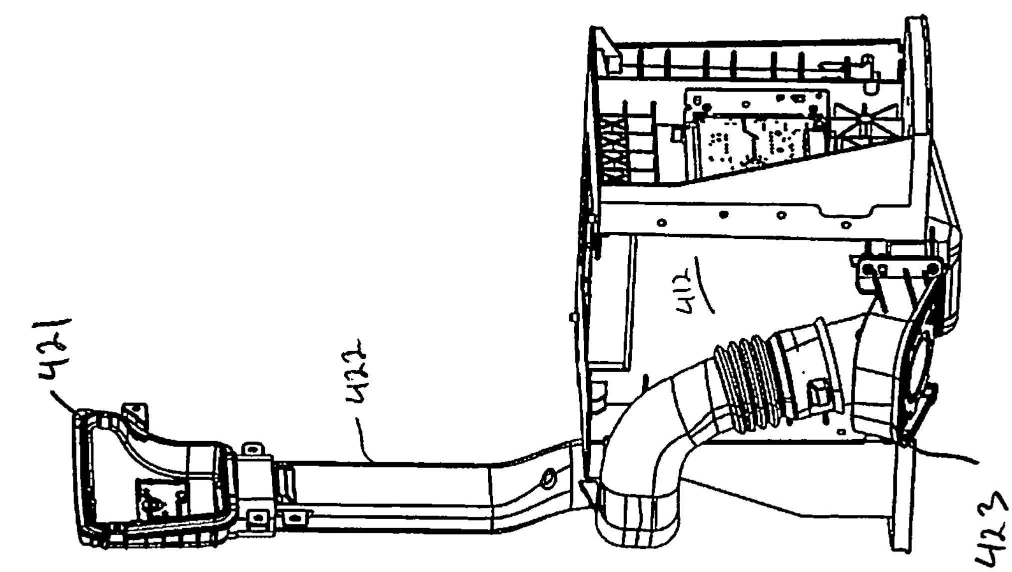


FIG. 33A

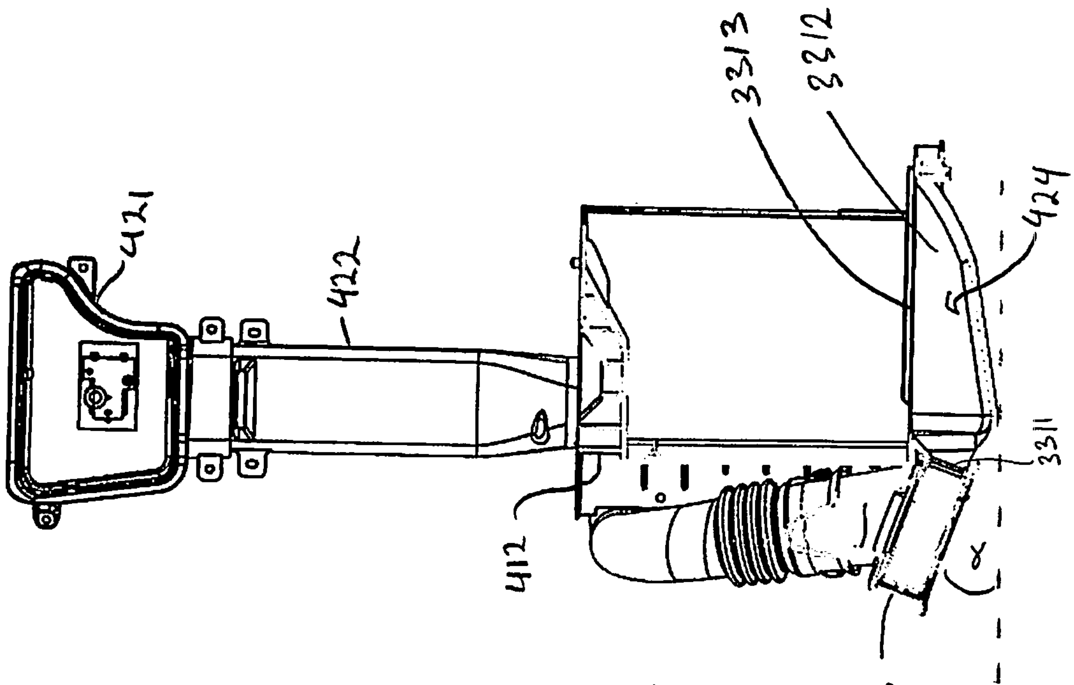


FIG 33C

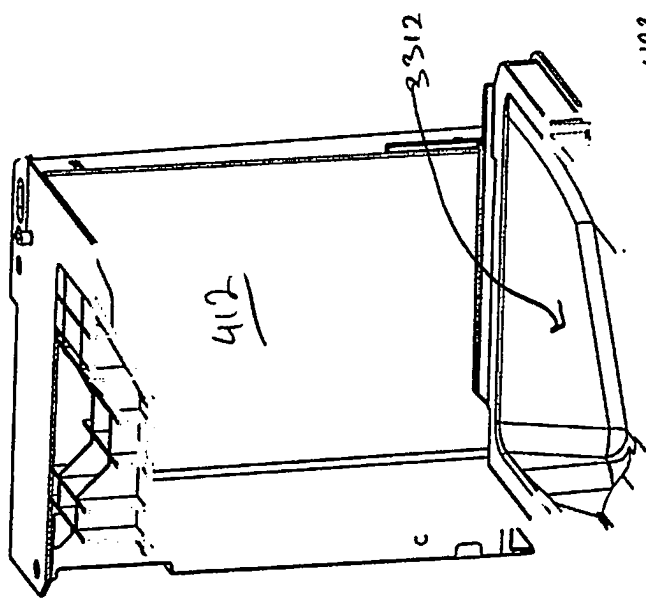


FIG. 33D

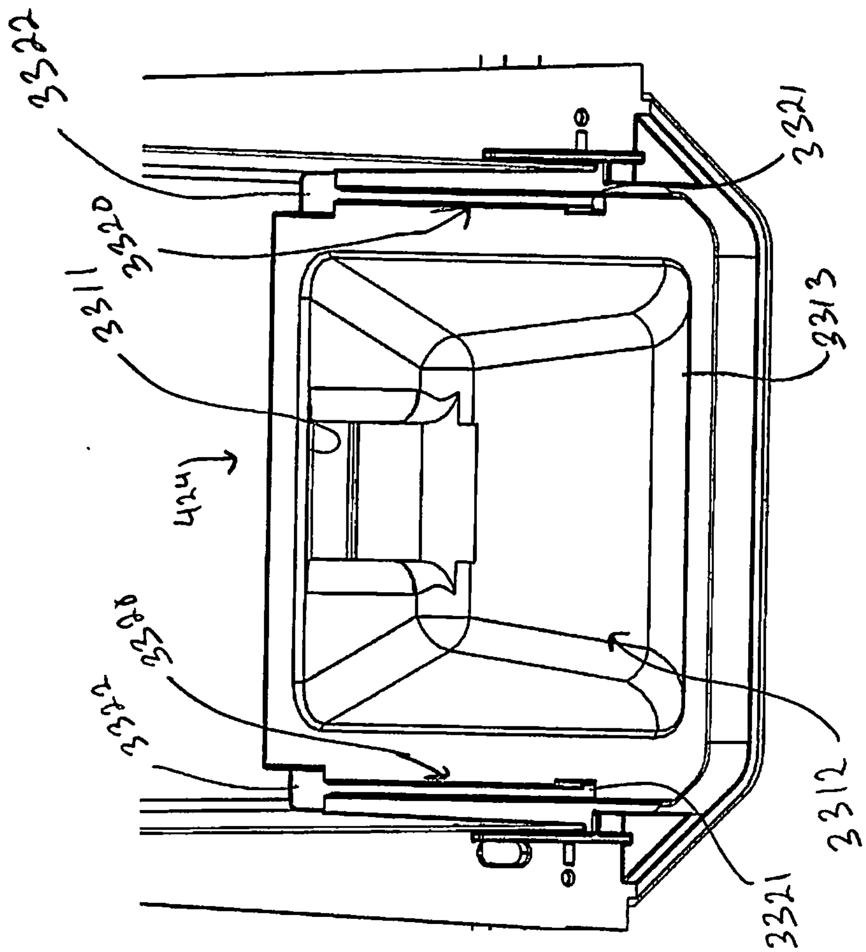


FIG. 33F

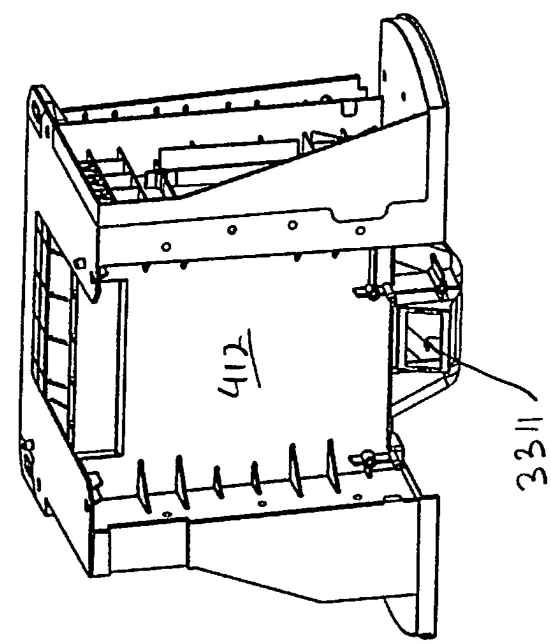


FIG 33E

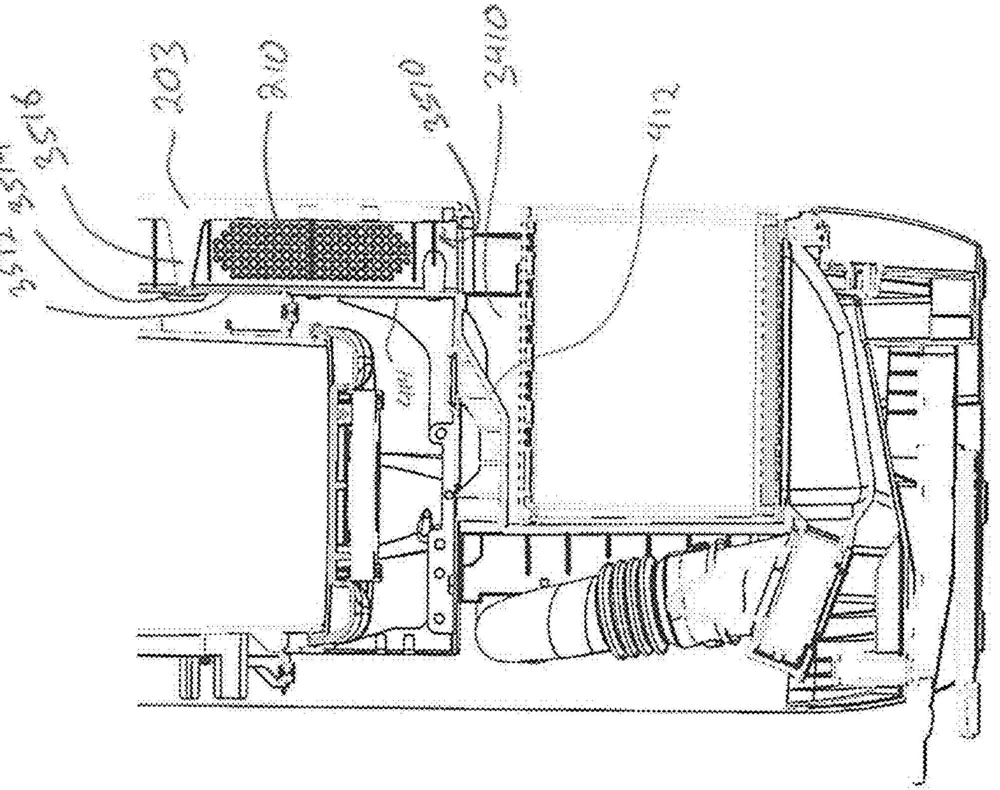


FIG. 35

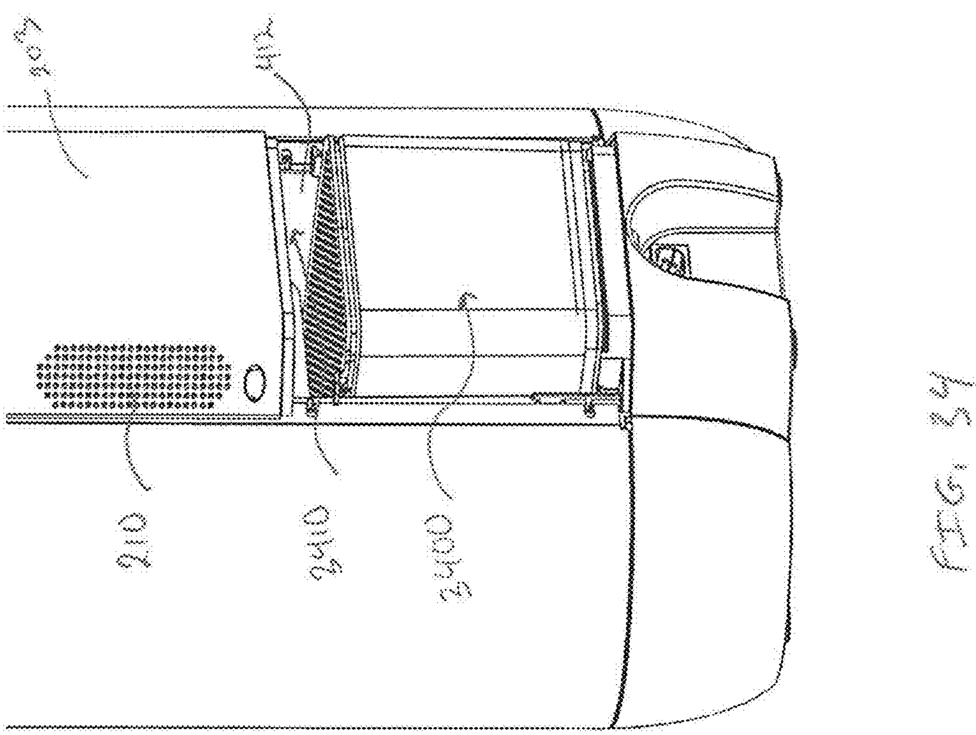


FIG. 34

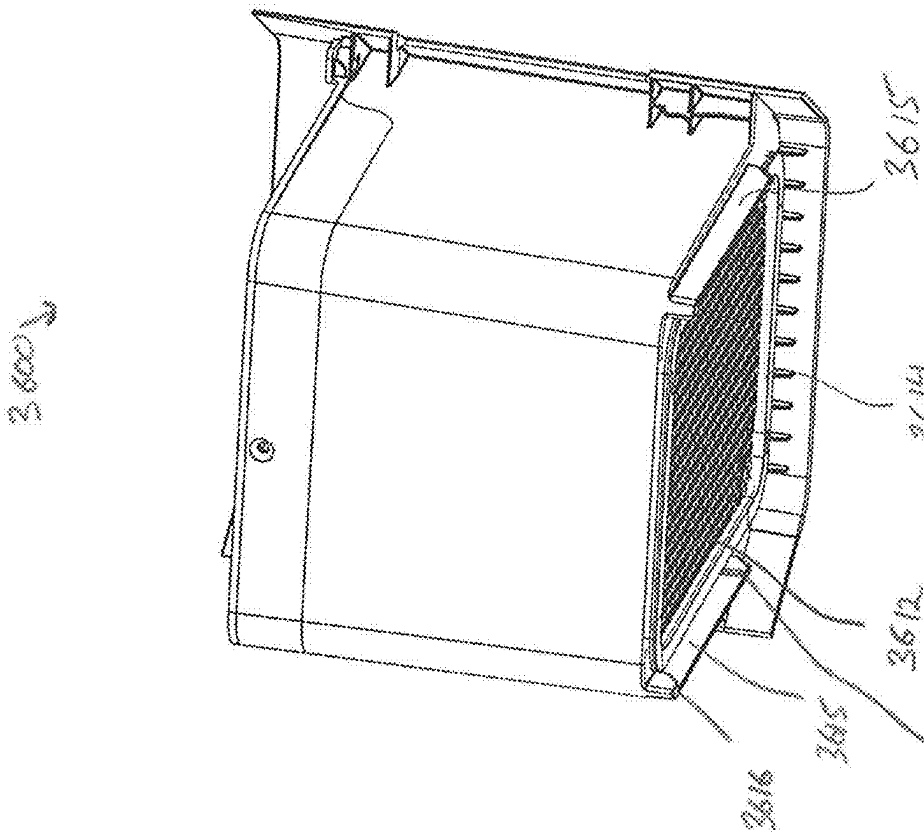


FIG. 36B

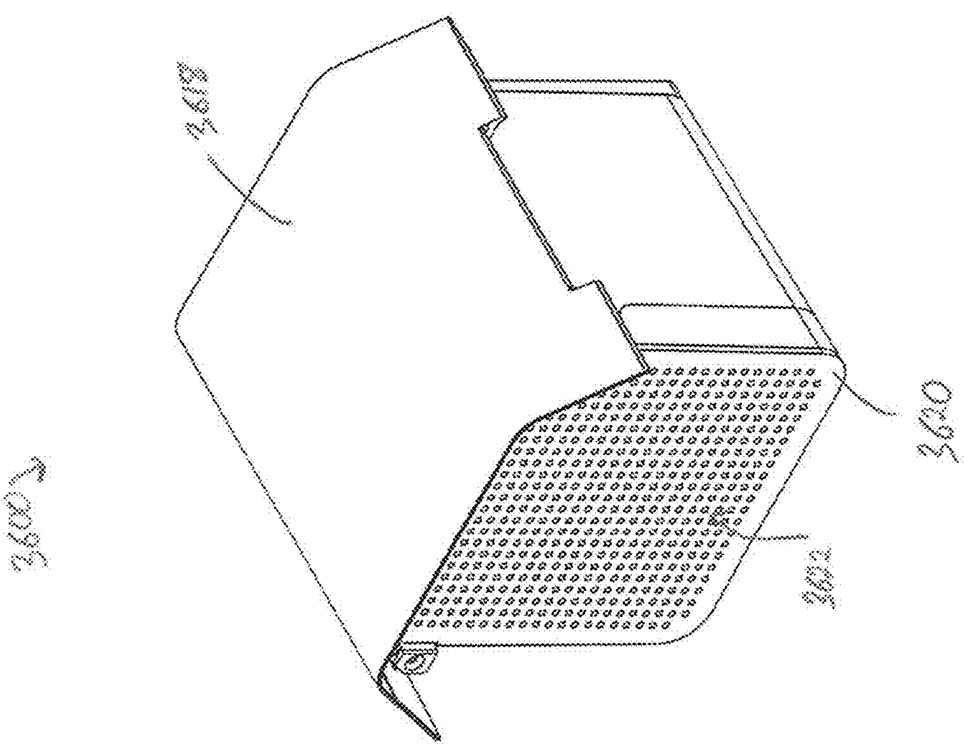


FIG. 36A

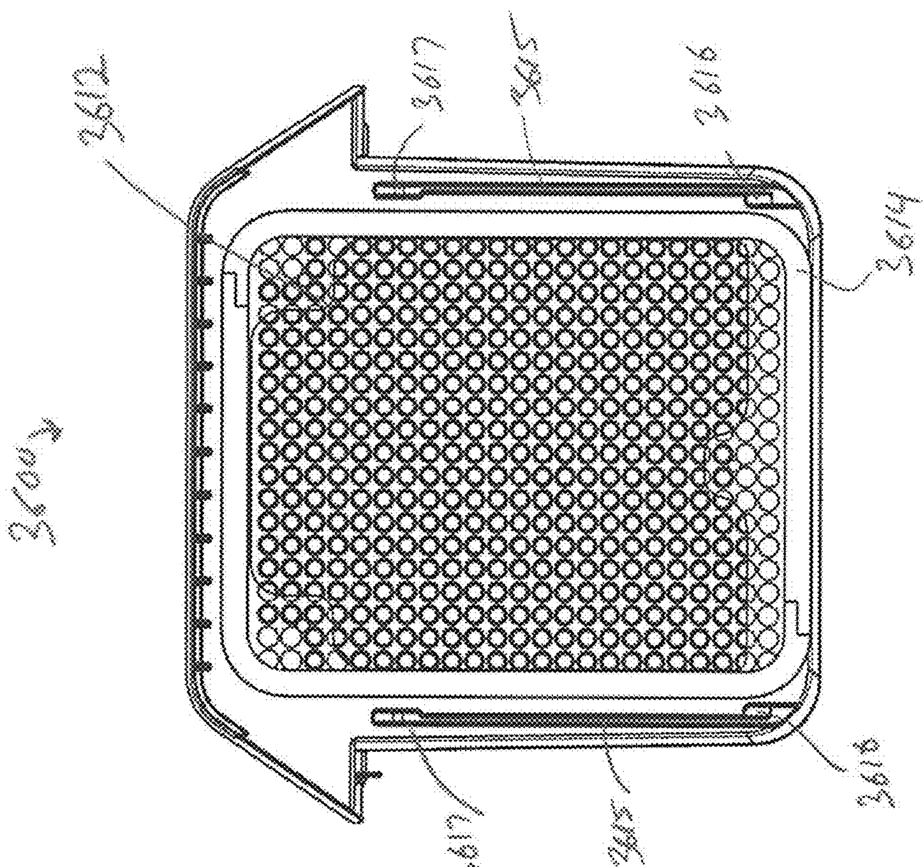


FIG. 36D

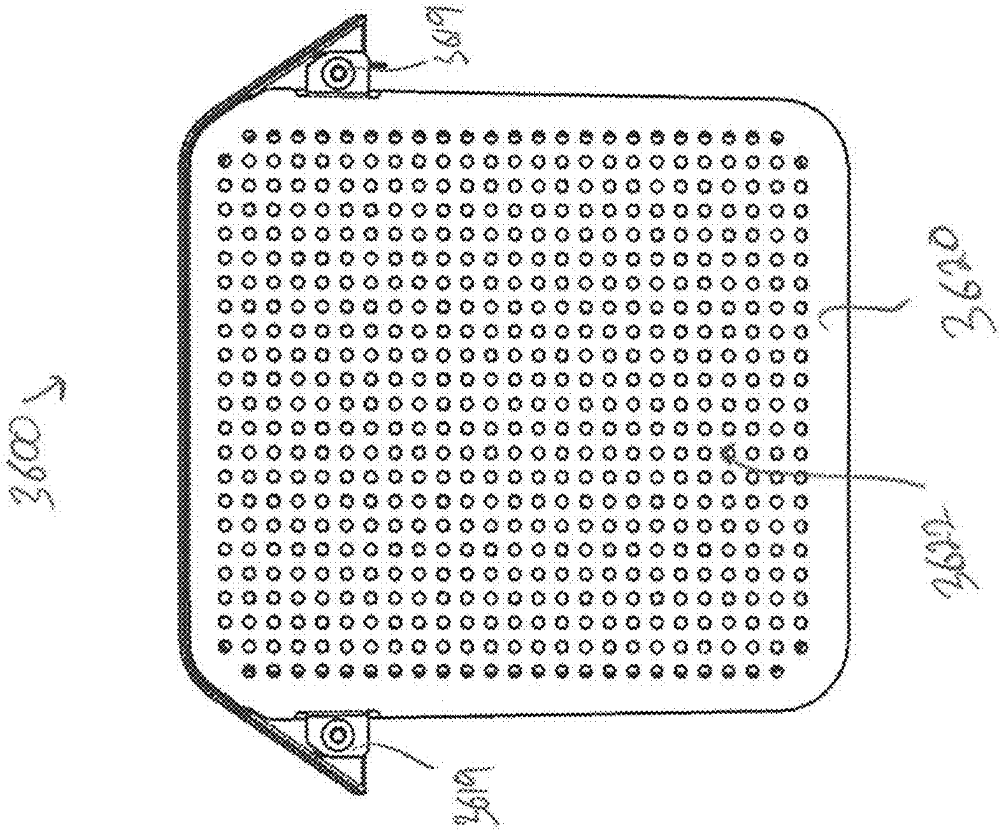


FIG. 36C

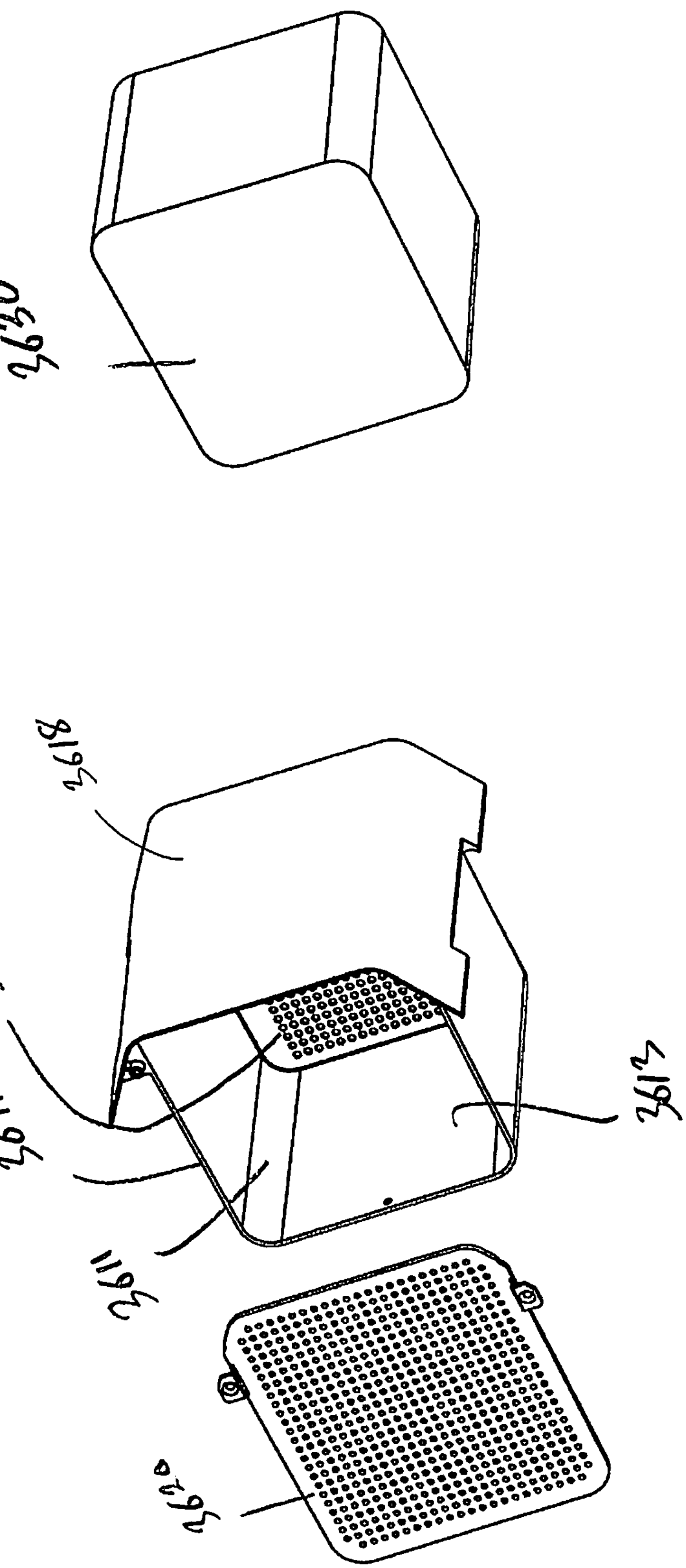


FIG. 36E

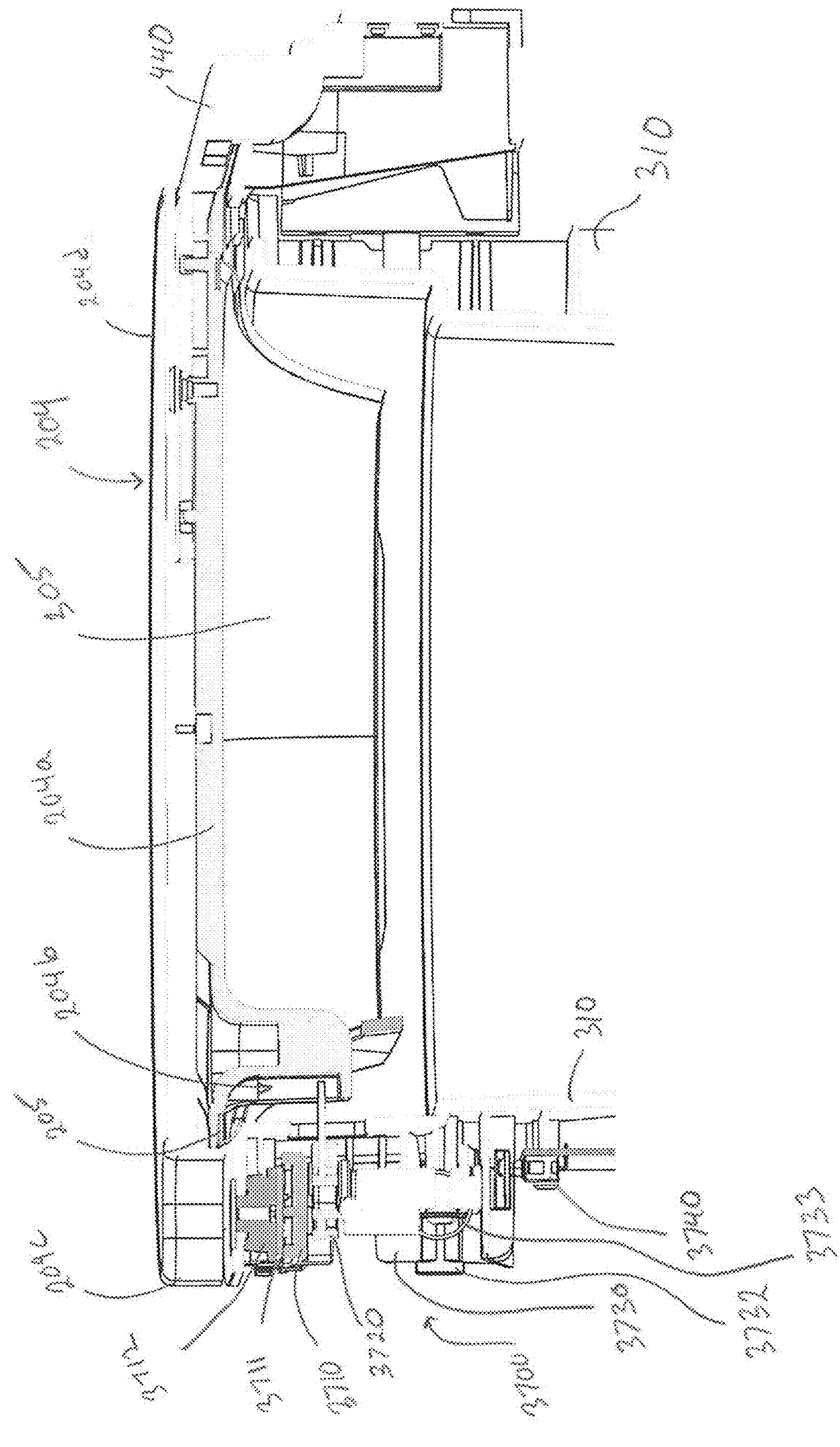

440
310
204d
204
508
204a
204b
505
204c
310
3740
3733
3732
3730
3700
3720
3710
3711
3712

FIG. 37A

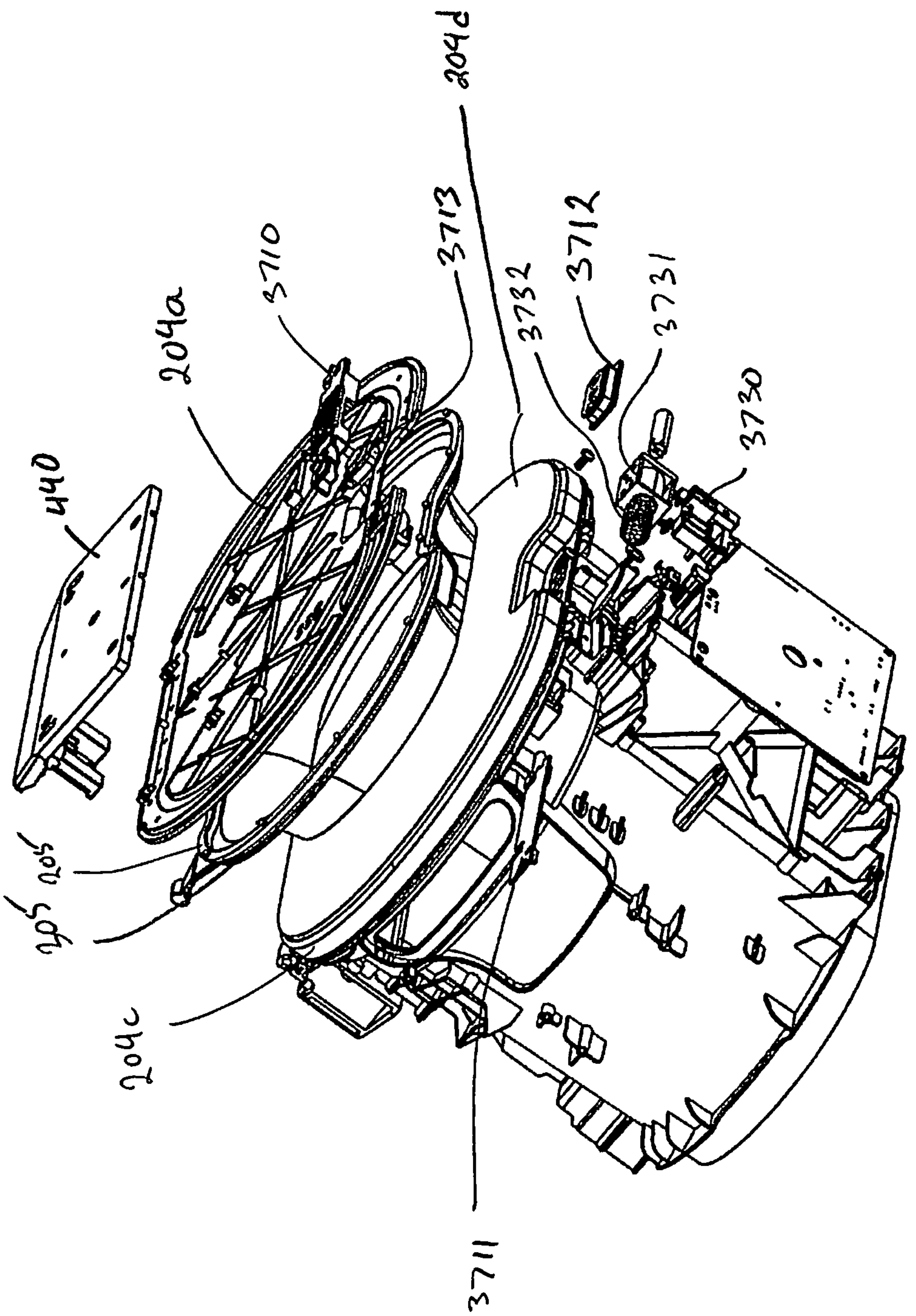


FIG. 37B

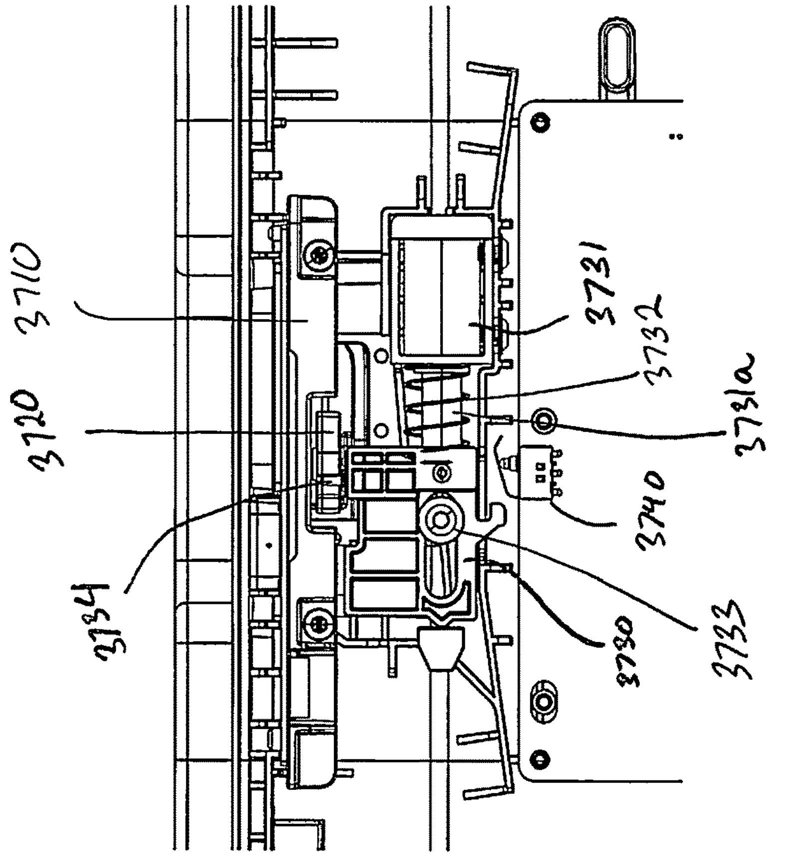


FIG. 37D

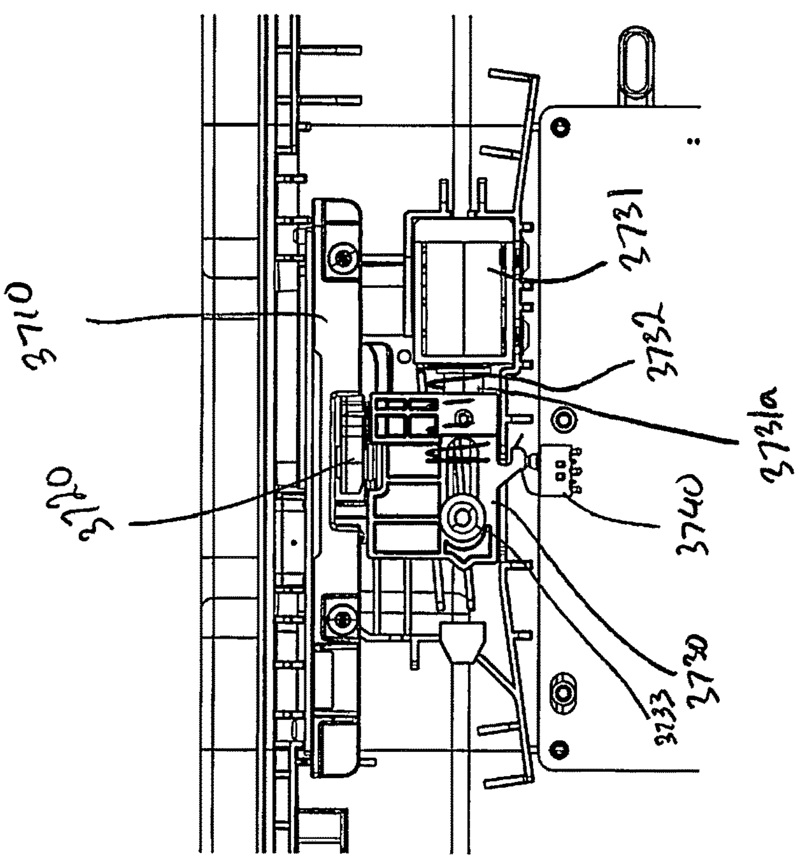


FIG. 37C

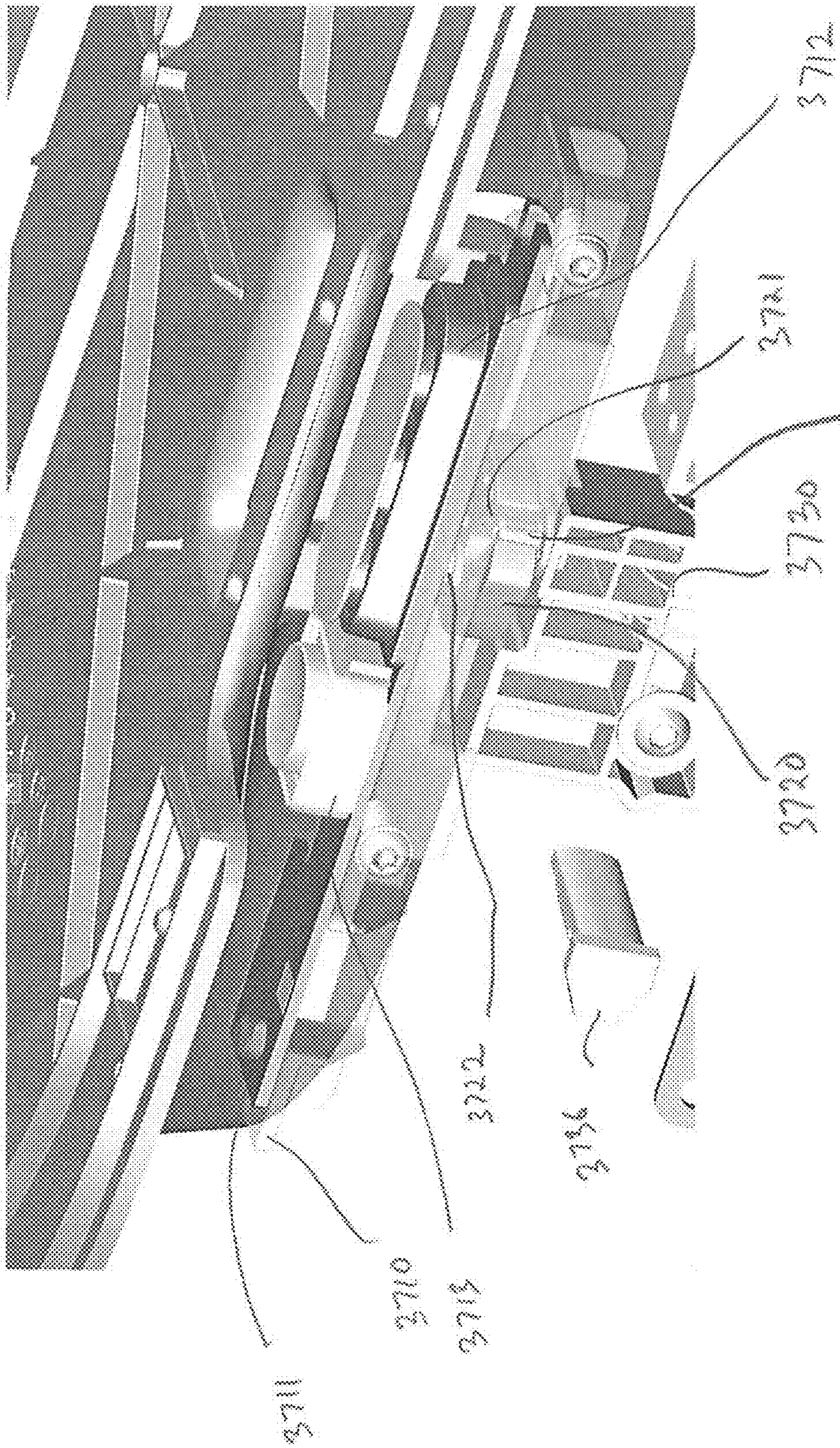


FIG. 37E

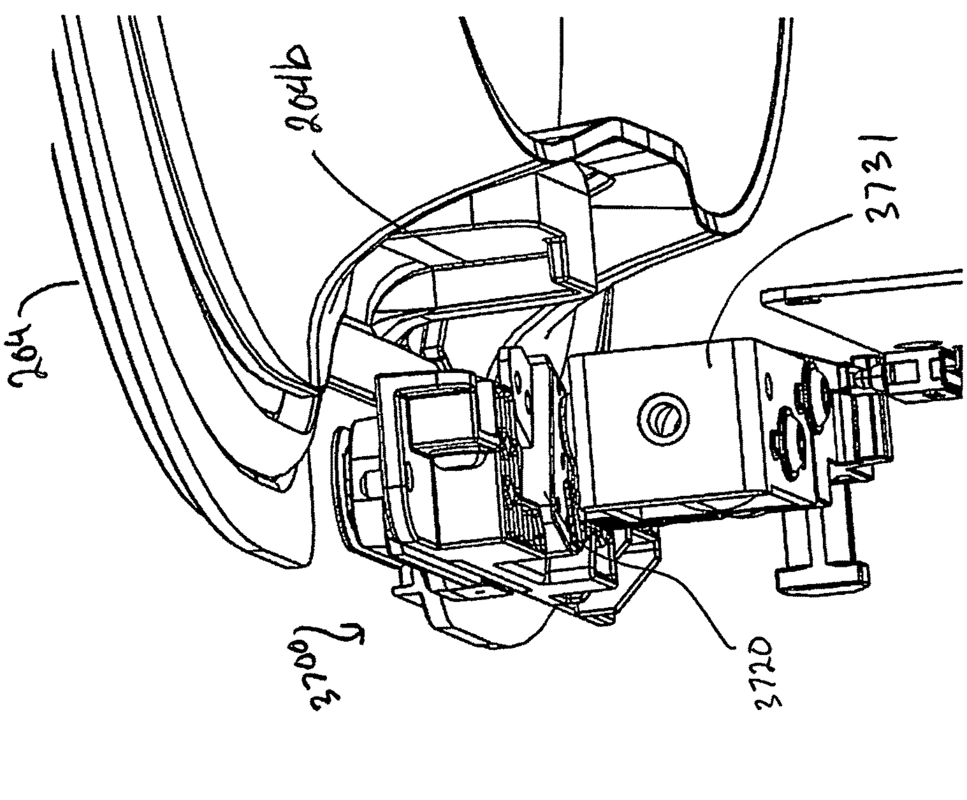


FIG. 37F

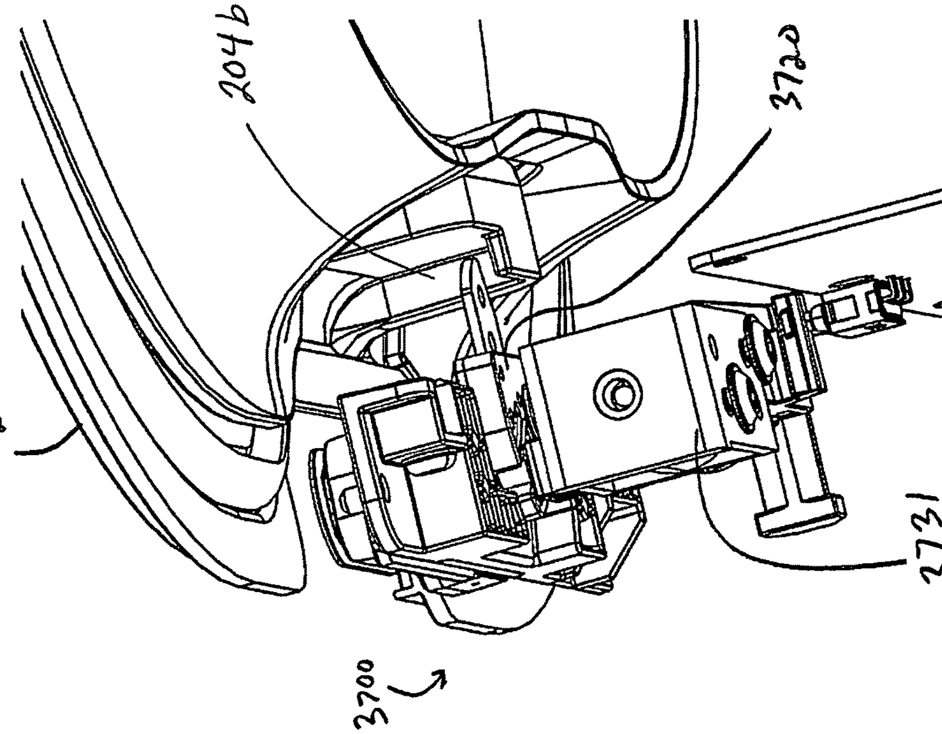


FIG. 37G

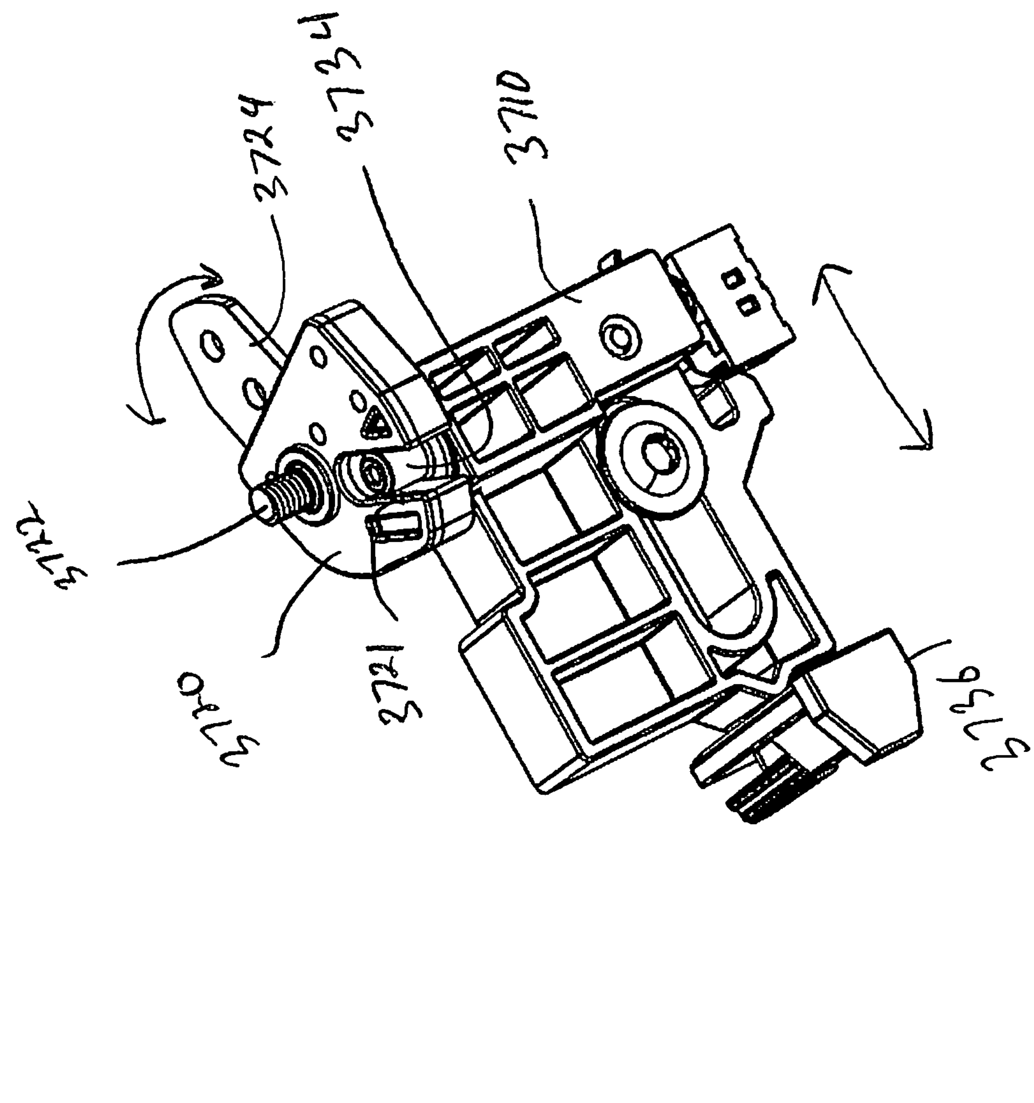


FIG. 37H

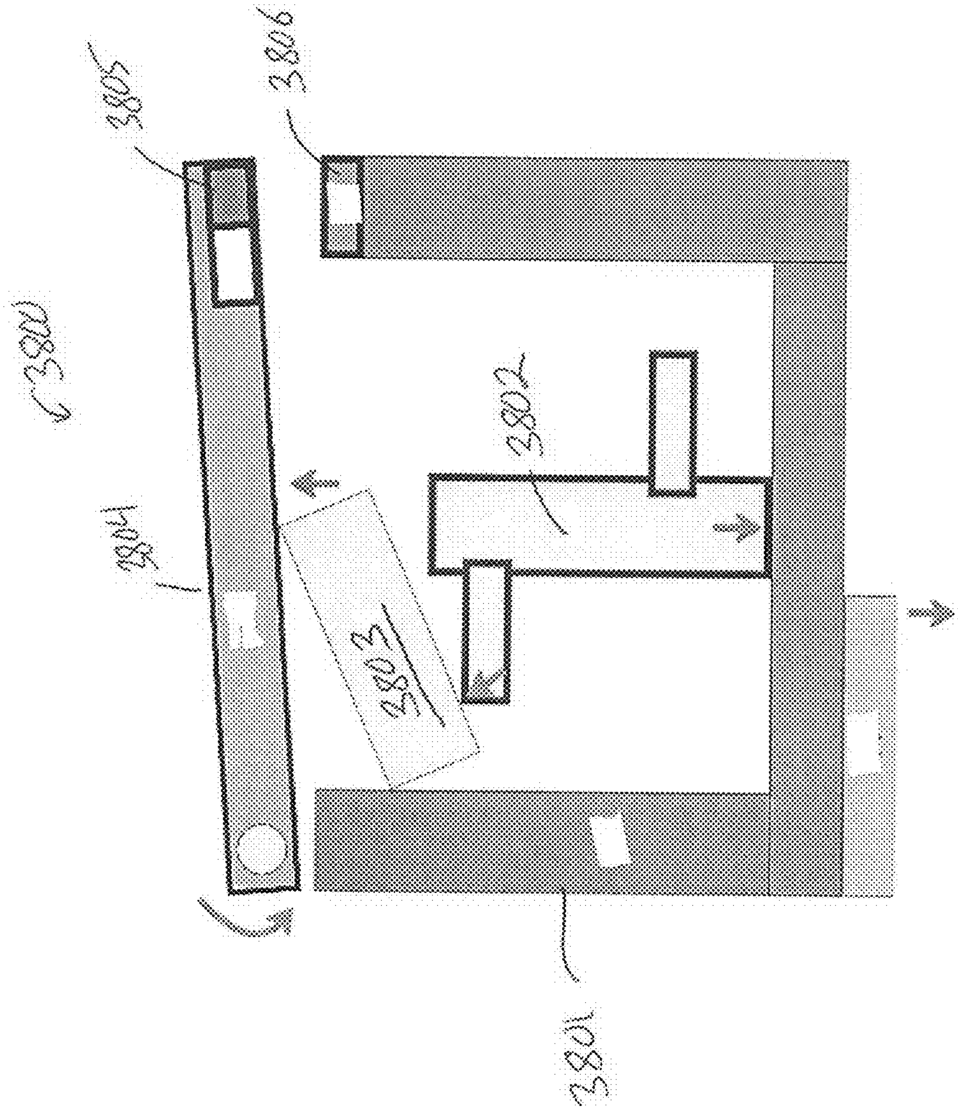
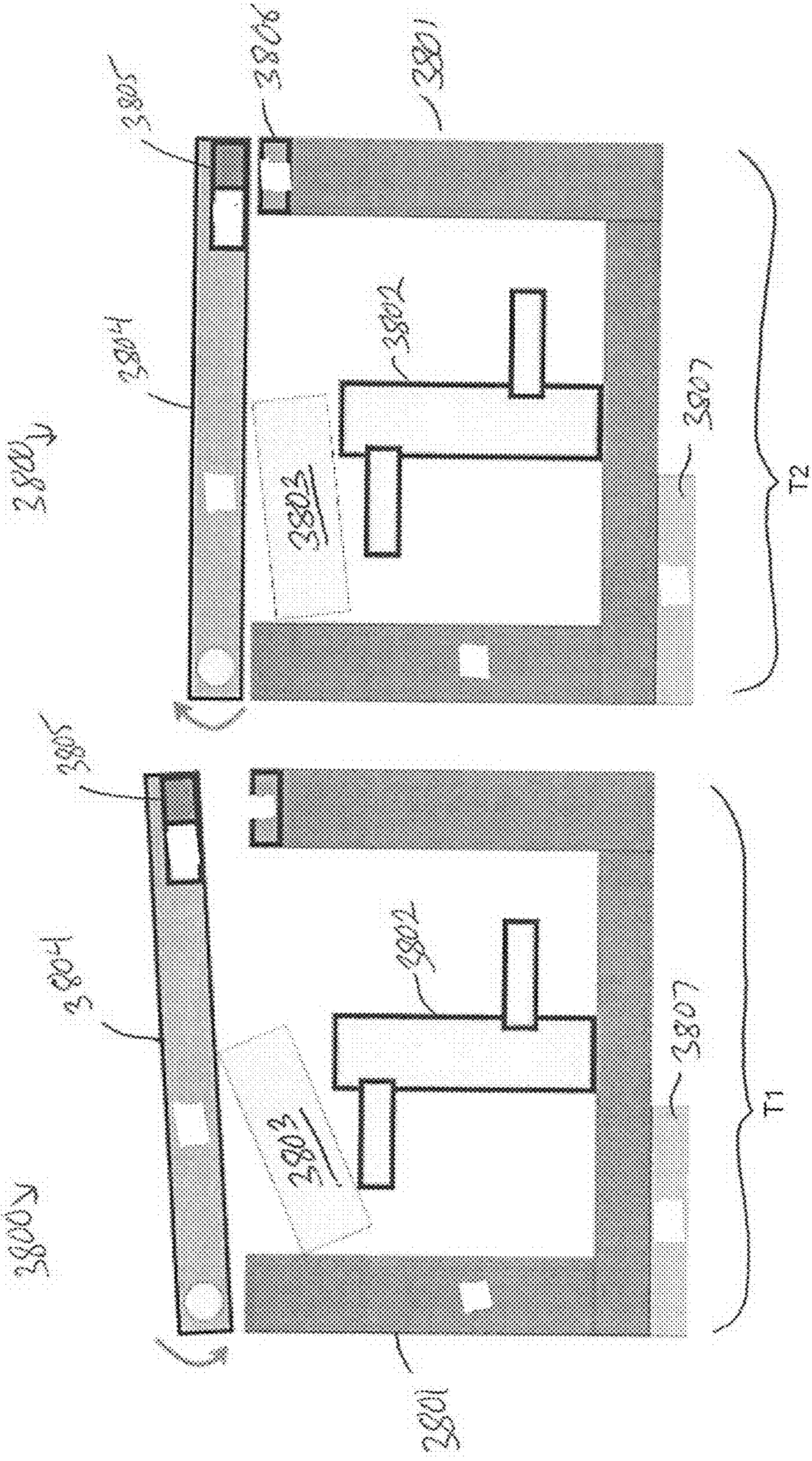


FIG. 38



3800
3801
3802
3803
3804
3805
3806
3807
T2
3800
3801
3802
3803
3804
3805
3807
T1

FIG. 39

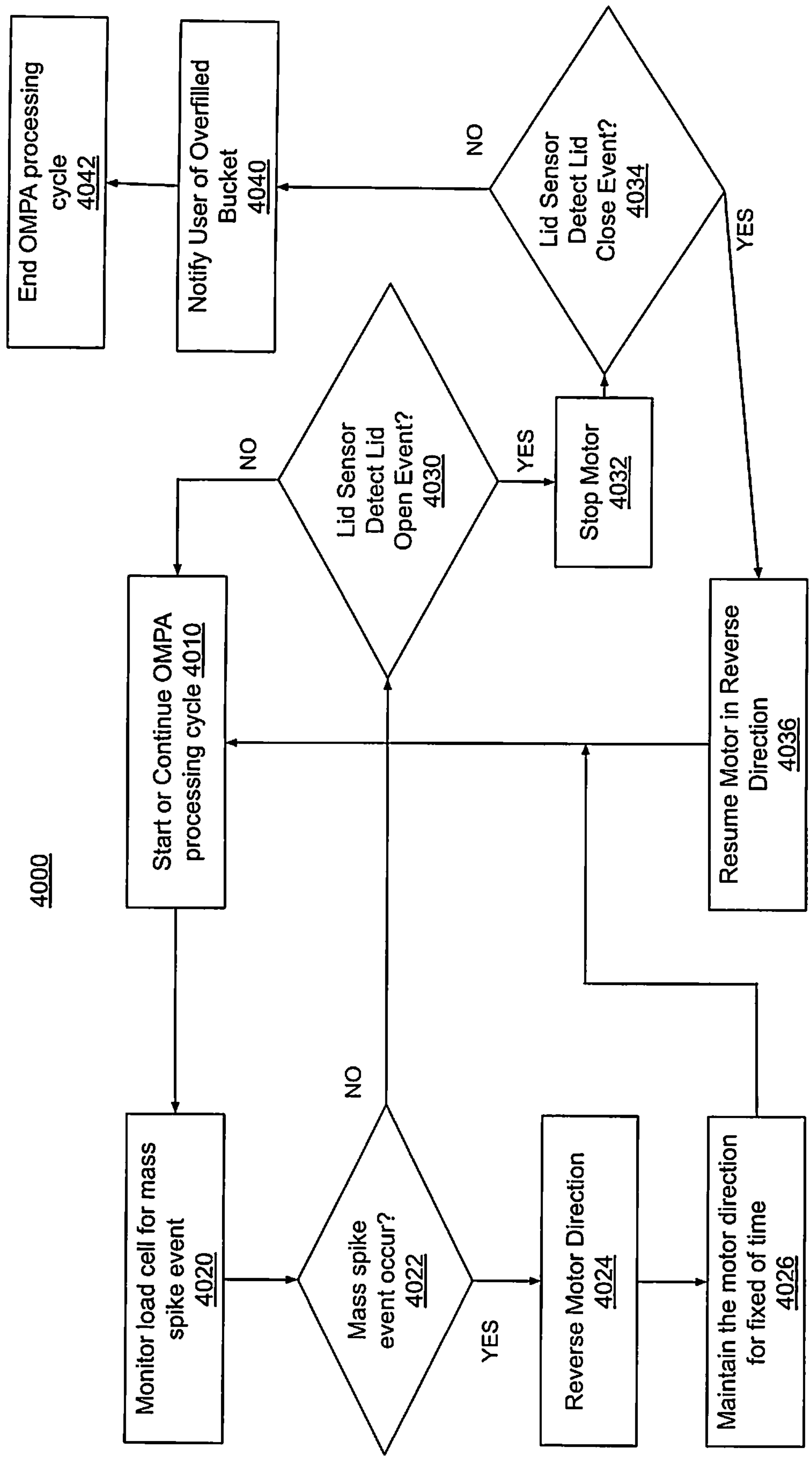

4000
Start or Continue OMPA processing cycle 4010
Monitor load cell for mass spike event 4020
Mass spike event occur? 4022
YES
NO
Reverse Motor Direction 4024
Maintain the motor direction for fixed of time 4026
Lid Sensor Detect Lid Open Event? 4030
YES
NO
Stop Motor 4032
Lid Sensor Detect Lid Close Event? 4034
YES
NO
Resume Motor in Reverse Direction 4036
Notify User of Overfilled Bucket 4040
End OMPA processing cycle 4042

FIG. 40

ORGANIC MATTER PROCESSING APPARATUS WITH OPEN LID PREVENTION AND METHODS OF USE THEREOF

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application No. 63/554,383, filed Feb. 16, 2024, U.S. Provisional Patent Application No. 63/559,759, filed Feb. 29, 2024, U.S. Provisional Patent Application No. 63/575,091, filed Apr. 5, 2024, and U.S. Provisional Patent Application No. 63/715,534, filed Nov. 2, 2024, the disclosures of which are incorporated by reference in their entireties.

TECHNICAL FIELD

[0002] This patent specification relates to apparatus and methods for processing organic matter, and more particularly to processing organic matter with a practical, user friendly, and internet connected apparatus.

BACKGROUND

[0003] The terms "waste management" and "waste disposal" may be used to refer to the activities required to manage waste from its inception to its disposal. These activities generally include the collection, transport, treatment, and disposal of waste, together with monitoring the process to ensure compliance with related ordinances, rules, and laws. Landfills represent the oldest form of waste management.

[0004] A common form of waste in landfills is food and other organic matter. This is a significant problem since food and other organic matter degrades into methane—a powerful greenhouse gas—without oxygen. These harmful emissions can be avoided by diverting food and other organic matter from landfills. One way to divert food and other organic matter from landfills is to process the food and other organic matter into a partially descicatted product using a conventional food recycler or food grinder. These conventional food recylers and food grinders, however, are not efficient in processing food and other organic matter.

BRIEF SUMMARY

[0005] Embodiments disclosed herein provide apparatus and methods for converting organic matter to a ground and selectively dried product. This can be accomplished using an organic matter processing apparatus that can intelligently and efficiently process a load of matter inserted into the apparatus.

[0006] A further understanding of the nature and advantages of the embodiments discussed herein may be realized by reference to the remaining portions of the specification and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1** includes a high-level illustration of an organic matter processing apparatus in accordance with various embodiments according to embodiment.

[0008] FIG. **1**A shows a simplified illustrative block diagram of an organic matter processing apparatus and airflow paths according to an embodiment.

[0009] FIG. **2**A includes a perspective front view of an organic matter processing apparatus according to embodiment.

[0010] FIG. **2**B includes a perspective rear view of the organic matter processing apparatus according to embodiment.

[0011] FIGS. **2**C-**2**F show front, back, top, and bottom views, respectively of the organic matter processing apparatus according to embodiment.

[0012] FIG. **3**A includes a perspective view of an organic matter processing apparatus without its lid according to embodiment.

[0013] FIG. **3**B illustrates another perspective view of the organic matter processing apparatus, with its lid and bezel removed, to show location of a used-air intake vent according to embodiment.

[0014] FIG. **3**C illustrates yet another perspective view of the organic matter processing apparatus, with its lid and bezel removed, to show location of an ambient air vent according to embodiment.

[0015] FIG. **3**D shows a view of an OMPA with an open lid, according to an embodiment.

[0016] FIG. **3**E shows a view of an OMPA with the lid and bezel in an open position, according to an embodiment.

[0017] FIG. **3**F shows an illustrative top view of and OMPA with the lid removed to show how the gasket overlays both top surface of the liner structure and bezel, according to embodiment.

[0018] FIGS. **4**A-**4**E shows different views of an organic matter processing apparatus with its durable housing removed to show additional details according to embodiment.

[0019] FIGS. **4**F-**4**J show different views of the organic matter processing apparatus with housing, spine member, cover, air treatment components, and inlet fan components all removed to show additional details according to an embodiment.

[0020] FIGS. **5**A-**5**E show various perspective views, a top view, and cross-sectional views of a liner structure, heat plate, overmold structure, mass bracket, load cell, drivetrain, and other components according to an embodiment.

[0021] FIG. **5**F shows multiple views of a drivetrain coupler according to an embodiment.

[0022] FIG. **5**G shows multiple views of another drivetrain coupler according to an embodiment.

[0023] FIG. **6**A shows a perspective view of a bucket assembly that includes a metal housing designed to fit securely within the liner structure of an OMPA according to embodiment.

[0024] FIG. **6**B shows a top view of the bucket assembly of FIG. **6**A according to an embodiment.

[0025] FIGS. **6**C and **6**D show respective bottom and side views of the bucket assembly of FIG. **6**A according to various embodiments.

[0026] FIGS. **6**E and **6**F shows different cross sectional views of the bucket assembly according to various embodiments.

[0027] FIG. **6**G shows multiple views of an impeller coupling according to an embodiment.

[0028] FIG. **6**H shows several views, including cross-sectional views of an impeller coupling engaged with a couple according to an embodiment.

[0029] FIG. **6**I shows an alternative bucket assembly to bucket assembly of FIG. **6**A according to an embodiment.

[0030] FIG. 7 shows an illustrative cross-sectional view of a bucket assembly with emphasis on impeller assemblies, impeller couplings, and drive train couplings according to an embodiment.

[0031] FIGS. 7A-7E show different views of a metal housing according to an embodiment.

[0032] FIGS. 7F-7J show different views of various blade arrays according to various embodiments.

[0033] FIGS. 8A-8G show different views of an impeller according to an embodiment.

[0034] FIGS. 8H-8J show different views of an impeller with a modified scraper according to an embodiment.

[0035] FIGS. 9A-9H show different views of another impeller according to an embodiment.

[0036] FIGS. 9I-9K show different views of an impeller with a modified scraper according to an embodiment.

[0037] FIG. 10 shows an illustrative process for processing organic matter with a bucket assembly, according to an embodiment.

[0038] FIG. 11 shows another illustrative process for processing organic matter with a bucket assembly, according to an embodiment.

[0039] FIG. 12 shows yet another illustrative process for processing organic matter with a bucket assembly, according to an embodiment.

[0040] FIG. 13 illustrates a network environment that includes a control platform according to embodiment.

[0041] FIG. 14 is a block diagram illustrating an example of a computing system in which at least some operations described herein can be implemented according to embodiment.

[0042] FIGS. 15A and 15B show different views of a load cell according to an embodiment.

[0043] FIGS. 16A and 16B show illustrative bottom and top perspective views, respectively, of a mass bracket according to embodiment.

[0044] FIGS. 17A and 17B show perspective top and bottom views of drivetrain assembly respectively according to an embodiment.

[0045] FIGS. 18A-18C show different illustrative views of the mass bracket and load cell according to an embodiment.

[0046] FIG. 18D shows a partial perspective view of a mass bracket, drivetrain assembly, and other bucket assembly components according to an embodiment.

[0047] FIG. 19 shows an illustrative cross-sectional view the bucket assembly and drivetrain and heating system according to an embodiment.

[0048] FIG. 20 shows an exploded view of a portion of the drivetrain and heating system according to an embodiment.

[0049] FIGS. 20A and 20B show respective bottom and top views of the drivetrain and heating system according to an embodiment.

[0050] FIGS. 21A and 21B show respective bottom and top views showing the overmold structure and the insulation layer according to an embodiment.

[0051] FIGS. 21C-21E show perspective bottom and top views of the overmold structure and the hot plate according to an embodiment.

[0052] FIG. 22 shows a perspective view of hot plate and insulation layer according to an embodiment.

[0053] FIG. 23 shows an illustrative process for measuring mass according to an embodiment.

[0054] FIGS. 24A-24C show different views of pedal assembly according to an embodiment.

[0055] FIGS. 25A-25F show different views of a hinge assembly and components thereof according to an embodiment.

[0056] FIGS. 25G and 25H show enlarged views of a hinge bracket and a hinge plate with emphasis on structures that enable the lid to be locked back in open position according to an embodiment.

[0057] FIGS. 26A-26E show different views of a hinge pusher according to an embodiment.

[0058] FIGS. 27A-27C show different views of a hinge bracket according to an embodiment.

[0059] FIGS. 28A-28B show different views of a hinge plate according to an embodiment.

[0060] FIGS. 29A-29E shows an illustrative view of the air intake system, or components thereof, according to an embodiment.

[0061] FIGS. 30A-30C show different views of a bezel according to an embodiment.

[0062] FIG. 30D shows different views of an alternative bezel according to an embodiment.

[0063] FIGS. 31A-31E show different views of parts of the air treatment system according to an embodiment.

[0064] FIGS. 32A-32E show different views of a duct according to an embodiment.

[0065] FIGS. 33A-33C show how the air treatment system is coupled to a midframe according to an embodiment.

[0066] FIGS. 33D-33F show different views of an air dispersion manifold according to an embodiment.

[0067] FIG. 34 shows a partial backside view of the OMPA with air treatment chamber according to an embodiment.

[0068] FIG. 35 shows an illustrative cross-sectional view of the OMPA with emphasis on air flow path for treated air, according to an embodiment.

[0069] FIGS. 36A-36E show different views of removable drawer according to an embodiment.

[0070] FIGS. 37A-37H show different views of lid locking mechanism according to an embodiment.

[0071] FIG. 38 shows an illustrative block diagram of OMPA according to an embodiment.

[0072] FIG. 39 shows another illustrative block diagram of OMPA according to an embodiment.

[0073] FIG. 40 shows an illustrative process for preventing lid opening events during OMPA processing according to an embodiment.

[0074] In the appended figures, similar components and/or features may have the same numerical reference label. Further, various components of the same type may be distinguished by following the reference label by a letter that distinguishes among the similar components and/or features. If only the first numerical reference label is used in the specification, the description is applicable to any one of the similar components and/or features having the same first numerical reference label irrespective of the letter suffix.

DETAILED DESCRIPTION

[0075] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing one or more exemplary embodiments. It being understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the invention as set forth in the appended claims.

[0076] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other elements in the invention may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0077] Also, it is noted that individual embodiments may be described as a process which is depicted as a flowchart, a flow diagram, a data flow diagram, a structure diagram, or a block diagram. Although a flowchart may describe the operations as a sequential process, many of the operations can be performed in parallel or concurrently. In addition, the order of the operations may be re-arranged. A process may be terminated when its operations are completed, but could have additional steps not discussed or included in a figure. Furthermore, not all operations in any particularly described process may occur in all embodiments. A process may correspond to a method, a function, a procedure, a subroutine, a subprogram, etc. When a process corresponds to a function, its termination corresponds to a return of the function to the calling function or the main function.

[0078] The term "machine-readable medium" includes, but is not limited to portable or fixed storage devices, optical storage devices, wireless channels and various other mediums capable of storing, containing or carrying instruction(s) and/or data. A code segment or machine-executable instructions may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted via any suitable means including memory sharing, message passing, token passing, network transmission, etc.

[0079] Furthermore, embodiments of the invention may be implemented, at least in part, either manually or automatically. Manual or automatic implementations may be executed, or at least assisted, through the use of machines, hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware or microcode, the program code or code segments to perform the necessary tasks may be stored in a machine readable medium. A processor(s) may perform the necessary tasks.

[0080] The organic matter processing apparatus can include a bucket assembly, a heating assembly, a drivetrain assembly, an air inlet system, an air treatment system, a pedal/lid linkage system, a lid lock assembly, sensors, communications circuitry, and one or more processors for controlling the apparatus. Each of these assemblies, systems, and components can operate together to provide users such as residential users an easy to use appliance to convert, for example, a day's worth of unused organic matter (e.g., unconsumed food) into a ground and shelf stable product at the end of a processing schedule (e.g., operate during the nighttime). The apparatus is capable of processing substantial volumes of organic matter over the course of days or weeks, depending on the frequency and amount of organic matter added thereto, without requiring the bucket to be emptied. This capacity can facilitate repeated use by users because they are not continuously inconvenienced with having to empty the bucket. Moreover the apparatus can intelligently operate itself to maximize efficiency in processing contents contained in the bucket to minimize runtime and minimize power consumption while best adhering to a processing schedule, minimizing wear and tear on components, and maximizing the operational life of air treatment media used to eliminate any odors present in the apparatus. For example, the apparatus can dynamically adjust heater temperatures, fan speeds, motor speeds, and motor rotation direction based on values obtained by the sensors. In addition, the apparatus can communicate with an application operating on a user device or with a backend server. This can enable, for example, remote control of the apparatus (e.g., instructing the apparatus to immediately start a processing event), exchange of status information between the apparatus and the applications, exchange of data for heuristics, artificial intelligence, big data analytics, compliance, statistics, etc., download firmware updates, provide data packages for municipalities, provide troubleshooting data, or any other suitable exchanges of data.

[0081] The bucket assembly can use a dual impeller configuration that can grind and paddle the organic matter contained therein. The bucket assembly can include a metal housing that has a flat bottom surface with multiple support structures that hold respective impeller assemblies that rotate about respective vertical axes within the bucket assembly. The impeller assemblies can include cutting structures and other extension members (e.g., integrated paddle cutting structure or paddles). One or more blade arrays can be mounted in a vertical orientation on a side of the metal housing plate and are configured to bisect the cutting structures and the integrated paddle cutting structure as the impeller assemblies rotate, resulting in fracture cutting and grinding of contents contained in the bucket. The configuration of the cutting structures, the integrated paddle cutting structures, and paddles mix and push organic matter down to the bottom of the bucket assembly during impeller assembly rotation. The bottom surface of the bucket assembly is adapted to be placed directly on a heated plate that transfers heat energy into the metal housing. A load cell is also provided to measure the mass of a drivetrain and heating system, a bucket assembly, and any contents contained in the bucket assembly.

[0082] The air intake system can include a fan and a heater to bring in ambient air from outside of the apparatus and optionally heat the air before it is injected into to the bucket assembly. The air treatment system can include a fan for drawing untreated air in from the bucket assembly and pushing it through an air treatment chamber that converts the untreated air to treated air before it is exhausted from the apparatus.

[0083] The lid may be opened in response depression of a pedal that is mechanically linked to a lid assembly. The lid assembly can include a hinge pusher that decouples the lid from the mechanical linkage connected to the pedal. This decoupling enables the lid to be opened independently of a pedal activation.

[0084] As defined herein, an organic matter processing apparatus (OMPA) is an aero-mechanical device operative to convert OMPA input into an OMPA output using judicious combinations of physical, aero, and thermal processes including grinding, paddling, electric heating, and airflow.

[0085] OMPA input is defined herein as predominantly organic matter that is intended for processing by the OMPA. OMPA input can include food matter and/or mixed organic matter. Food matter can include consumable food items such as fats, oils, sweets such as sugars and chocolates, dairy products such as milk, yogurt, cheese, proteins such as meat (and bones thereof), poultry (and bones thereof), fish (and bones thereof), beans, eggs, and nuts, vegetables, fruits, and starches such as bread, cereal, pasta, and rice. Food matter is sometimes referred to as foodstuffs. Mixed organic matter can include paper or other fiber materials (e.g., soiled napkins or paper towels), compostable resins, compostable plastics, cellulosic materials (e.g., compostable silverware), and other non-food organic materials. OMPA input can also include other types of biodegradable matter (e.g., compostable diapers).

[0086] For many implementations, OMPA input may include food matter and/or mixed organic matter that is post-consumer, post-commercial, or post-industrial in nature, matter that if not processed according to the present teachings could be considered as waste, garbage, refuse, leavings, remains, or scraps. By way of example, food that is leftover on a child's dinner plate, and not in suitable condition or quantity to be stored and served later as leftovers, can represent one example of OMPA input. As another example, items such as potato peels, apple cores, cantaloupe rinds, broccoli stumps, and so forth, and similar organic materials that are spun off from the food preparation process, can represent other examples of OMPA input.

[0087] OMPA output is defined herein as processed organics derived from transformation of organic matter processed by the OMPA to yield a ground and selectively desiccated product. The processed organics can be a substantially desiccated product having water content ranging between 0.1 and 30 percent of total weight, between 5 and 25 percent of total weight, between 5 and 20 percent of total weight, between 1 and 15 percent of total weight, between 5 and 15 percent of total weight, between 10 and 15 percent of total weight, between 10 and 20 percent of total weight, between 15-20 percent of total weight, or between 10 and 25 percent of total weight. Alternatively, the processed organics can be a substantially desiccated product having water content of less than 15 percent of total weight, less than 10 percent of total weight, or less than 5 percent of total weight. The processed organics can exist as granulated or ground media. One type of processed organics can be FOOD GROUNDS™.

[0088] As defined herein FOOD GROUNDS™ refers to an OMPA output characterized as having a minimum nutritional value. FOOD GROUNDS™ can be derived from OMPA input comprised of a minimum percentage of food matter such that the FOOD GROUNDS™ OMPA output has the minimum nutritional value. The minimum percentage of food matter can ensure that the FOOD GROUNDS™ OMPA output attains at least the minimum nutritional value. For example, a higher nutrient value OMPA output can be more readily obtained from food matter than from mixed organics such as fiber materials and cellulosic materials.

[0089] As defined herein, an OMPA output processor repurposes the OMPA output for a commercial purpose. For example, the OMPA output can be used as feed or feedstock for feed for animals or fish. In some embodiments, an OMPA output processor that receives FOOD GROUNDS™ may produce a derivative product having a higher intrinsic value (e.g., nutritional, monetary, or both nutritional and monetary) than a derivative product produced primarily from mixed organics.

[0090] As defined herein, non-processed matter refers to matter that is not intended for processing by an OMPA or an OMPA output processor. Non-processed matter is not an OMPA input or an OMPA output. An example of non-processed matter can include inorganic matter such as, for example, metals, plastics, glass, ceramics, rocks, minerals, or any other substance that is not linked to the chemistry of life. Another example of non-processed matter can be yard waste such as grass clippings, leaves, flowers, branches, or the like. In very general terms, non-processed matter can refer to the garbage or waste that a resident or business disposes in a conventional trash bin for transport to a landfill processor, a recycle bin for transport to recyclables processor, or a yard waste bin for transport to a yard waste processor.

[0091] In one embodiment, the OMPA is designed to be used primarily in a residential context (e.g., in single family homes, townhouses, condos, apartment buildings, etc.) to convert residential based OMPA input into residential sourced OMPA output. Converting residential generated OMPA input to OMPA output can have a net positive effect in the reduction of methane and space occupied by landfills or compost centers by redirecting the OMPA input and the OMPA output thereof away from traditional reception centers of such material. Moreover, because the OMPA is user friendly, aesthetically pleasing, energy efficient, clean, and substantially odor free, the OMPA provides an easy to use platform for the residential sector to handle OMPA input (e.g., food scraps, etc.), thereby making the decision on what to do with residential based OMPA input an easier one to handle. The OMPA can convert OMPA input into FOOD GROUNDS overnight, where the FOOD GROUNDS are substantially odorless, easily transportable, and shelf-stable. The FOOD GROUNDS can remain in the OMPA until it is full, at which point the FOOD GROUNDS are removed and transported to an OMPA processing facility, which may convert the FOOD GROUNDS into a higher value food product (e.g., animal feed). It should be understood that OMPAs can be used to serve entire communities, cities, and industries. Use of OMPAs in these other sectors, as well as the residential sector, can result in diversion from landfills and further serve a goal of preventing OMPA input from becoming waste in the first place by converting it into usable products that can be used to enable more resilient, sustainable food systems.

Overview of Organic Matter Processing Apparatus

[0092] FIG. **1** includes a high-level illustration of a OMPA **100** in accordance with various embodiments. As further discussed below, OMPA **100** may have a durable housing **102** with an interface **104** through which a processing chamber **106** can be accessed. Interface **104** may serve as the ingress interface through which OMPA input can be deposited into processing chamber **106** and the egress interface through which the product can be retrieved from processing chamber **106**. As shown in FIGS. **2**A and **2**B, the OMPA may take the form of a roughly cylindrical or elliptically shaped container that has an aperture along its top end.

[0093] Instructions for operating OMPA **100** may be stored in a memory **108**. Memory **108** may be comprised of any suitable type of storage medium, such as static random-access memory (SRAM), dynamic random-access memory (DRAM), electrically erasable programmable read-only memory (EEPROM), flash memory, or registers. In addition to storing instructions that can be executed by controller **110**, memory **108** can also store data that is generated by OMPA **100**. For example, values generated by one or more sensors **128** included in OMPA **100** may be stored in memory **108** in preparation for further analysis, as further discussed below. As further discussed below, these values may relate to characteristics (e.g., humidity or temperature) of the air traveling through OMPA **100**, and insights into the OMPA input contained in processing chamber **106** can be gained through analysis of these values. Note that memory **108** is merely an abstract representation of a storage environment. Memory **108** could be comprised of actual integrated circuits (also referred to as "chips"). When executed by a controller **110**, the instructions may specify how to control the other components of OMPA **100** to produce OMPA output from OMPA input in processing chamber **106**. Controller **110** may include a general purpose processor or a customized chip (referred to as an "application-specific integrated circuit" or "ASIC") that is designed specifically for OMPA **100**.

[0094] Generally, OMPA **100** is able to operate on its own. Assume, for example, that OMPA **100** determines that OMPA input has been deposited into processing chamber **106** based on measurements output by a weight sensor (also referred to as a "mass sensor"), as further discussed below. In response to such a determination, OMPA **100** may initiate processing of the OMPA input. Note, however, that the OMPA input need not necessarily be processed immediately. For example, OMPA **100** may not dry and then grind the OMPA input until a given criterion (e.g., time of day, weight of OMPA input, etc.) or combination(s) of various criteria is/are satisfied.

[0095] While OMPA **100** may be able to operate largely, if not entirely, on its own, there may be some situations where input from a user will be helpful or necessary. For example, the user may want to indicate when processing should be temporarily halted so that additional OMPA input can be added to processing chamber **106**. As another example, the user may request that an operation be initiated or halted. For instance, the user could opt to initiate a "drying cycle" if the ambient environment is expected to be vacant, or the user could opt to halt a "grinding cycle" if the ambient environment is expected to be occupied. The various cycles of OMPA **100** are discussed in greater detail below.

[0096] As shown in FIG. **1**, OMPA **100** may include a control input mechanism **112** (also referred to as a "data input mechanism" or simply "input mechanism") with which the user can interact to provide input. Examples of input mechanisms include mechanical buttons and keypads for tactile input, microphones for audible input, scanners for visual input (e.g., of machine-readable codes, such as barcodes or Quick Response codes), and the like. OMPA **100** may also include a control output mechanism **114** (also referred to as a "data output mechanism" or simply "output mechanism") for presenting information to inform the user of its status. For example, control output mechanism **114** may indicate the current cycle (e.g., whether OMPA input is being processed, or whether product is ready for retrieval), connectivity status (e.g., whether OMPA **100** is presently connected to another electronic device via a wireless communication channel), and the like. One example of an output mechanism is a display panel comprised of light-emitting diodes (LEDs), organic LEDs, liquid crystal elements, or electrophoretic elements. In embodiments where the display panel is touch sensitive, the display panel may serve as the control input mechanism **112** and control output mechanism **114**. Another example of an output mechanism is a speaker that is operable to output audible notifications (e.g., in response to a determination that the product is ready for retrieval).

[0097] Some embodiments of OMPA **100** are able to communicate with other electronic devices via wireless communication channels. For example, a user may be able to interact with OMPA **100** through a control platform (not shown) that is embodied as a computer program executing on an electronic device. The control platform is discussed in greater detail below with reference to FIG. **11**. In such embodiments, OMPA **100** may include a communication module **116** that is responsible for receiving data from, or transmitting data to, the electronic device on which the control platform resides. Communication module **116** may be wireless communication circuitry that is designed to establish wireless communication channels with other electronic devices. Examples of wireless communication circuitry include chips configured for Bluetooth®, Wi-Fi®, ZigBee®, LoRa®, Thread, Near Field Communication (NFC), and the like.

[0098] OMPA **100** may include a power interface **118** (also referred to as a "power port" or "power jack") that is able to provide main power for the drying and grinding functionality, as well as power for the other components of OMPA **100**, as necessary. The power interface **118** may allow OMPA **100** to be physically connected to a power source (e.g., an electrical outlet) from which power can be obtained without limitation. Alternatively, power interface **118** may be representative of a chip that is able to wirelessly receive power from the power source. The chip may be able to receive power transmitted in accordance with the Qi standard developed by the Wireless Power Consortium or some other wireless power standard. Regardless of its form, power interface **118** may allow power to be received from a source external to the durable housing **102**. Power interface **118** may include, for example, a plug configured to accept a power cord that can be attached and detached therefrom and can be connected to an AC outlet to supply power to OMPA **100**. By enabling the power cord to be attached and detached from power interface **118**, any suitable length of power cord can be used can be supplied with the OMPA. In some embodiments, a user can order a two foot, four foot, or eight food cord as needed. In addition to power interface **118**, OMPA **100** may include a power component **120** that can store power received at power interface **118**. Power component **118** could advantageously be useful to maintain some or all operations (e.g., the state of communications and functionality of electronic components) in the event of a power outage. Examples of power components include rechargeable lithium-ion (Li-Ion) batteries, rechargeable nickel-metal hydride (NiMH) batteries, rechargeable nickel-cadmium (NiCad) batteries, and the like.

[0099] In order to produce an OMPA output from OMPA input, OMPA **100** (and, more specifically, its controller **110**) may control one or more drying mechanisms **122**A-N, one or more grinding mechanisms **124**A-N, and one or more heating mechanisms **105**A-N. The drying mechanisms **122**A-N are responsible for drying out or substantially removing moisture content of the OMPA input. Drying may not only allow the OMPA input easier to process (e.g., grind), but also may prevent the formation of mold that thrives in humid conditions. Examples of drying mechanisms include heating elements that reduce moisture by introducing heat and fans that reduce moisture by introducing airflow. Meanwhile, the grinding mechanisms are responsible for cutting, crushing, or otherwise separating the OMPA input into fragments. Examples of grinding mechanisms include paddles, mixers, impellers, and rotating blades (e.g., with two, three, or four prongs). Grinding mechanisms are normally comprised of a durable material, such as die cast aluminum, stainless steel, or another material that offers comparable strength and rigidity. Heating mechanism **105**A-N may impart heat directly to processing chamber **106** to assist in drying out any OMPA input contained therein. Examples of the heating mechanism can include a hot plate that interfaces with a bottom surface of processing chamber **106**. As another example, a heater may exist in an ambient air inlet path that can heat the air being forced into processing chamber **106** by one of drying mechanisms **122**A-N. By working in concert, the drying, grinding, and heating mechanisms **122**A-N, **124**A-N, and **105**A-N can convert OMPA input into a more stable product as further discussed below.

[0100] Moreover, air may be drawn from the ambient environment into the durable housing **102** and then expelled into the processing chamber **106** so as to help dry the OMPA input contained therein to desired moisture content levels, as further discussed below. As shown in FIG. **1**, air that is drawn from the processing chamber may be treated using one or more air treatment mechanisms **126**A-N (also referred to as "air management mechanisms" or "air discharge mechanisms") before being released back into the ambient environment.

[0101] Other components may also be included in OMPA **100**. For example, sensor(s) **128** may be arranged in various locations throughout OMPA **100** (e.g., along the path that the air travels through OMPA **100**). Sensor(s) **128** may include a proximity sensor that is able to detect the presence of nearby individuals without any physical contact. The proximity sensor may include, for example, an emitter that is able to emit infrared (IR) light and a detector that is able to detect reflected IR light that is returned toward the proximity sensor. These types of proximity sensors are sometimes called laser imaging, detection, and ranging (LiDAR) scanners. Alternatively, the presence of an individual may be inferred based (i) whether sounds indicative of the user are detectable (e.g., by a passive microphone or an active sonar system) or (ii) whether an electronic device associated with the user is detectable (e.g., by the communication module **116**).

[0102] OMPA **100** may adjust its behavior based on whether any individuals are nearby. For instance, OMPA **100** may change its operating state (or simply "state") responsive to a determination that an individual is nearby. As an example, OMPA **100** may stop driving the grinding mechanisms upon determining that someone is located nearby. Thus, OMPA **100** could intelligently react to changes in the ambient environment. Over time, outputs produced by the proximity sensor (plus other components of OMPA **100**) could be used to better understand the normal schedule of individuals who frequent the physical space in which OMPA is situated.

[0103] In some embodiments, OMPA **100** includes an ambient light sensor whose output can be used to control different components. The ambient light sensor may be representative of a photodetector that is able to sense the amount of ambient light and generate, as output, values that are indicative of the sensed amount of ambient light. In embodiments where control output mechanism **114** is a display panel, the values output by the ambient light sensor may be used by the controller **110** to adjust the brightness of the display panel.

[0104] In some embodiments, OMPA **100** can include one or more media capture devices such as a camera or video camera that can take pictures or videos of OMPA input inserted into the processing chamber (e.g., to identify what OMPA input item has been added), monitor conversion of OMPA input to OMPA output, or generate video shorts showing conversion of OMPA input to OMPA output for uploading to a cloud based viewing platform (e.g., TikTok™ or YouTube™) or for viewing on a propriety application running a user's device. Additional components such as IR sensors, heat sensors, and LiDAR sensors may be positioned to directly monitor contents contained in the bucket assembly. The data obtained by observing the contents of the processing chamber can be used as input to an OMPA processing algorithm that running natively on the OMPA and/or can be transmitted to a backend server that uses the data for various other purposes (e.g., data collection, metrics, to improve OMPA operations, etc.).

[0105] FIG. **1**A shows a simplified illustrative block diagram of OMPA **150** and airflow paths according to an embodiment. OMPA **150** can include lid and hinge assembly **155**, pedal and linkage **160**, air intake assembly **165**, bucket assembly **170**, mass system **180**, and air treatment system **190**. Lid and hinge assembly **155** work in concert with pedal and linkage **160**. For example, when a user depresses a pedal, a mechanical linkage is activated to cause the hinge assembly to move and thereby open the lid. Air intake assembly **165** is operative to draw ambient air into the OMPA via first fan **166** and optionally heat the ambient air before directing the air into bucket assembly **170**. Bucket assembly **170** may be akin to processing chamber **106** of FIG. **1** and various bucket assembly embodiments discussed below. Mass system **180** may measure the mass of a subset of components (e.g., bucket assembly **170**) of OMPA **150** and organic content contained in bucket assembly **170**. Air treatment system **190** may be akin to the air treatment mechanism **126**A-N. OMPA **150** has a length corresponding to an X axis, a width corresponding to a Z axis, and a height corresponding to a Y axis.

[0106] Air intake assembly **165** may be responsible for controlling a first airflow path in which ambient air is pulled into OMPA lid by first fan **166** and directed into bucket assembly **170**. The first air flow path forces air into bucket assembly **170** to assist bucket assembly **170** in drying any OMPA input that is being processed therein. Air intake assembly **165** may optionally preheat the ambient air using a heater (not shown) prior to directing the air into bucket assembly **170**. The heated air may further assist bucket assembly **170** with processing OMPA input to produce OMPA output. Heating the ambient air may also reduce the moisture content of the air being injected into bucket assembly **170** and the moisture of the air being treated by air treatment system **190**. Reducing the moisture content of the air circulating in the OMPA can improve efficiency of OMPA input processing and air treatment.

[0107] Air treatment system **190** may be responsible for controlling a second airflow path in which untreated air is drawn from bucket assembly **170** by second fan **172** and directed through air treatment chamber (ATC) **174**, which converts the untreated air to treated air that is exhausted away from OMPA **150**. As defined herein, untreated air refers to air that has been in the vicinity of bucket assembly **170** and has potentially been imparted with particles or compounds that have odorous qualities. As defined herein, treated air refers to air that been "scrubbed" or "cleaned" of particles or compounds that have odorous qualities. Air treatment chamber **174** can be one or more of an activated carbon chamber and an ultraviolet light chamber. Air treatment system **190** may heat the untreated air using a heater (not shown) to reduce moisture content of the untreated air before the air is pushed through an activated carbon filter (not shown). The activated carbon filter can extract odor causing molecules from the air as it passes through the filter such that treated air is exhausted out of OMPA **150**.

[0108] When the lid is in a closed configuration and OMPA **150** is managing operations that require use of first fan **166** and second fan **172**, OMPA **150** may ensure that a negative pressure differential is maintained between inlet air and exhausted air. This negative pressure differential can be achieved by operating second fan **172** at a higher airflow rate (e.g., higher cubic feet per minute (CFM)) than first fan **166**. In other words, the airflow rate (or volume) of treated air exiting out of OMPA **150** is greater than the airflow rate (or volume) of ambient air being pulled into OMPA **150**. This can ensure that air treatment system **190** controls the flow of air from bucket assembly **170** to the exhaust port and prevents any untreated air from prematurely exiting OMPA **150**.

[0109] FIG. **2**A includes a front-side perspective view of OMPA **200** that includes a lid **204** in a closed position. FIG. **2**B includes a rear-side perspective view of OMPA **200**. FIGS. **2**C-**2**F show front, back, top, and bottom views, respectively of OMPA **200**. The following discussion will reference one or more of FIGS. **2**A-**2**F. Lid **204** may be pivotably connected to durable housing **202**, to allow a user to easily expose and then cover a processing chamber (not shown) located inside the durable housing **202**. As described further herein, OMPA **200** can be advantageously designed and configured such that it can be placed flush against a wall or other barrier in a space-saving manner, in that it does not require gapped separation from the wall, while at the same time maintaining the ability for good airflow in and out of OMPA **200**.

[0110] OMPA **200** can include spine member **203** that forms a backbone or column structure that is centered along the back side of OMPA **200** and projects outwardly from the elliptical shape of durable housing **202**. Exhaust ports **210** may exist in spine member **203**, as shown. Spine member **203** can include removable panel **211** that provides access to an air treatment media chamber (not shown) so that the air treatment media (e.g., activated carbon) can be serviced as needed. In some embodiments, removable panel **211** can be a removable drawer configured to hold the air treatment media (e.g., see FIGS. **36**A-**36**E). OMPA **200** can include user interface region **280** that exists adjacent to lid **204** and can reside on a liner structure (e.g., shown as liner structure **310** in FIGS. **3**A-**3**C). User interface region **280** can include button **281** and display **282**. Button **281** may be user depressible to initiate several different instructions (e.g., start operation, cease operation, reset, lock and unlock a lid lock, etc.). Display **282** may include an LCD screen, a dead fronted display, any other suitable display. User interface region **280** may remain unobstructed when lid **204** is open or closed. OMPA **200** can include pedal **290** that can be depressed by a user to open lid **204**. Pedal **290** may be part of a mechanical linkage that causes lid **204** to open and close. Support plate **292** may be positioned on the bottom of OMPA **200** to provide stability. As shown in FIG. **2**F, support plate **292** can cover a portion of the OMPA footprint.

Drying OMPA Input Through Airflow Generation

[0111] One core aspect of the OMPA is its ability to dry OMPA input that is deposited into the processing chamber. By removing moisture from the OMPA input through a judicious application of heating, grinding, mixing, and airflow according to the teachings herein, the OMPA can substantially halt decomposition of the OMPA input and produce a stable mass of dried-and-grinded OMPA input (hereinafter "OMPA output" or "end product" or simply "product"). This can be accomplished by directing an airflow through the processing chamber that causes the OMPA input to become increasingly dry in a predictable manner.

[0112] As shown in FIGS. **2**B and **2**D, housing **202** can include integrated air inlet and handle structures **206** that have one or more air ingress openings (or simply "openings") through which air can be drawn from the ambient environment by a first fan (e.g., a fan designated for drawing air into the OMPA) installed within OMPA **200**. Here, for example, integrated air inlet and handle structures **206** can be located near the top of OMPA **200** near lid **204** and on a back side of OMPA **200**. Integrated air inlet and handle structures **206** can provide a handle for a user to move OMPA **200** to a desired location. Advantageously, there may be a built-in offset between a curved outer surface of air inlet and handle structures **206** and a backmost plane of the overall durable housing **202**, whereby airflow into OMPA **200** will not be impeded even while the backmost plane is flush against a wall. As shown, air inlet and handle structures **206** are positioned on the backside of housing **202** and adjacent to spine member **203**. If desired, for example, air ingress openings may be placed at different locations on OMPA **200** to ensure that sufficient air can be drawn into OMPA **200** by the first fan even if OMPA **200** is positioned proximate to an obstacle (e.g., a wall).

[0113] FIG. **3**A shows a perspective view of OMPA **200** with the lid removed according to an embodiment. With removal of lid **204**, bezel **305** is shown covering liner structure **310**. Bezel **305** may be an ellipsoid ring that can pivot up and down, for example, in a path similar to how the lid can pivot up and down. In some embodiments, bezel **305** can be removed. Bezel **305** may assist in air flow direction and can prevent organic matter from splashing up towards the lid. Bezel **305** may also help guide OMPA input into the bucket assembly (not shown) when a user is inserting OMPA input therein. Bezel **305** is pivoted up or removed to allow for insertion and removal of a bucket assembly (not shown).

[0114] FIG. **3**B shows a partial perspective view of OMPA **200** with lid and bezel **305** removed according to an embodiment. This view shows untreated air inlet port **312** contained in liner structure **310**. Untreated air is drawn from the processing chamber through untreated air inlet port **312** for treatment by an air treatment system (not shown). The untreated air is pulled into the air treatment system via untreated air inlet port **312** via a second fan, treated by the air treatment system, and treated air is expelled from the OMPA via exhaust ports **210**. Untreated air inlet port **312** can be covered with a removable filter, screen, a porous structure, a vent, or other structure that covers port **312** but allows air to flow through. Gasket **205** is shown to illustrate where it would be relative to bezel **305** and liner structure **310** when lid **204** is closed.

[0115] FIG. **3**C show another partial perspective view of OMPA **200** with lid and bezel **305** removed according to an embodiment. This view shows openings **308** contained in liner structure **310**. Ambient air pulled in from the environment external to OMPA **200** by the first fan is expelled toward the processing chamber through one or more openings **308**. Bezel **305** (not shown) may direct the air downward to cause turbulence inside the processing chamber, thereby increasing the rate at which the OMPA input is dried. The speed of the first fan may be roughly proportional to the speed of the turbulent airflow. OMPA **200** may increase the speed of the first fan if quicker drying is desired.

[0116] FIG. **3**D shows a perspective view OMPA **200** with lid **204** in an open position and bezel **305** still in closed position according to an embodiment. FIG. **3**E shows a perspective view of OMPA **200** with lid **204** and bezel **305** open. Gasket **205** can be secured to lid **204** and extends around a periphery of lid **204** so that when lid **204** is closed, a seal can be formed between lid **204** and bezel **305** and between lid **204** and top surface **311** of liner structure **310**. Bezel **305** is shown to include air redirection members, discussed in detail in connection with FIGS. **30**B and **30**C. FIG. **3**F shows an illustrative top view of OMPA **200** with the lid removed to show how the gasket **205** overlays both top surface **311** and bezel **305**, as shown.

[0117] Accordingly, referring back to FIGS. **2**A-**2**D and FIG. **3**C, the first fan may draw air through air inlet and handle structures **206** and then direct the air into the bucket via openings **308** such that air is further downward toward any OMPA input contained in the OMPA, thereby to create a turbulent airflow (also referred to as a "turbulent airstream"). This turbulent airflow may create small vortices inside the processing chamber that ensure the air continues to move across the OMPA input. The second fan can pull untreated air from the processing chamber, for processing in an air treatment system, and exhausted via exhaust ports **210**.

[0118] FIGS. **4**A-**4**E show different views of OMPA **200** with the durable housing **202** removed according to an embodiment. Removing housing **202** from the figures shows various support structures and subsystems of OMPA **200** that are discussed in more detail throughout the specification. FIGS. **4**F-**4**J show different views of OMPA **200** with housing **202**, spine member **203**, cover **211**, air treatment components, and inlet fan components all removed. The following discussion may reference one or more of FIGS. **4**A-**4**K. Many of the components shown in FIGS. **2**A-**2**F and FIGS. **3**A-**3**C are also shown in FIGS. **4**A-**4**L, as evidenced by use of the same reference numbers. Starting at the bottom of OMPA **200** and working up to lid **204**, exists housing base **410**, midframe structure **412**, mass bracket structure **414**, and liner structure **310**. These four components can form the structural framework of OMPA **200** that supports all other components and subsystems thereof. Midframe structure **412** is secured to housing base **410** and to mass bracket structure **414**. Mass bracket structure **414** is secured to liner structure **310**. Lid **204** is mounted to a hinge plate **440** (shown in FIGS. **4**H-**4**I) and is configured to sit on top of liner structure **310** when in the closed position.

[0119] The air treatment subsystem can include exhaust airflow adapter **421**, exhaust duct **422**, exhaust fan housing **423**, air dispersion manifold **424**, a media chamber, sensors (not shown), and exhaust ports **210**. Exhaust airflow adapter **421** is secured to liner structure **310** such that air is drawn from the bucket assembly via port **312**. A gasket (e.g., rubber or foam gasket) may exist between the interface of airflow adapter **421** and liner structure **310**. Exhaust duct **422** is coupled to airflow adapter **421** and can be mounted to liner structure **310**. If desired, a gasket can exist at the coupling between airflow adapter **421** and exhaust duct **422**. Alternatively, exhaust duct **422** may be configured to be press fit within airflow adapter **421** to form a substantially airtight seal. Exhaust duct **422** is also coupled to exhaust fan housing **423**. If desired, a gasket can exist at the coupling between duct **422** and housing **423**. In addition, duct **422** can be configured to be press fit around housing **423** to further create an airtight seal. Exhaust fan housing **423** can be secured to midframe structure **412**. A fan (not shown) is contained in exhaust fan housing **423**. This fan draws untreated air in from the bucket assembly via port **312**, adapter **421**, and duct **422** and redirects the air to the media chamber (not shown) by blowing the untreated air into air dispersion manifold **424**, which evenly distributes the untreated air to ensure uniform airflow upwards through the media chamber. The untreated air is treated by media (e.g., activated carbon) contained in the media chamber and expelled via exhaust ports **210** as treated air. A sensor may be incorporated within airflow adapter **421** to monitor characteristics (e.g., humidity, temperature, VOCs, etc.) of exhaust air being drawn from the bucket assembly.

[0120] The air inlet system can include air intake manifold **431**, fan **432**, heater (not shown), and sensor (not shown). Air intake manifold **431** can be secured to liner **310** and to fan **432**. Liner **310** may have integrated features that, together with manifold **431**, form an air duct that conveys ambient air drawn in from fan **432** to be injected into the bucket assembly via openings **308**. In one embodiment, a gasket is not needed to form a seal between manifold **431** and liner **310**. Fan **432** can draw in ambient air via air inlet and handle structures **206**. The heater can be selectively activated to heat ambient air prior to being injected into the bucket assembly. A sensor may be incorporated within air intake manifold **431** to monitor characteristics (e.g., humidity, temperature, VOCs, etc.) of the ambient air (or heated ambient air) being injected into the bucket assembly.

[0121] The air inlet system and the air treatment system are configured to accommodate the relatively large height to relatively small width and depth dimensions of the OMPA. The configurations can result in thinly profiled and vertically oriented systems that have minimal impact on OMPA sizing and industrial design, as generally shown in FIGS. **4**A-**4**D. Additional details of these systems are discussed below in connection with FIGS. **29**A-**35**.

[0122] Mass bracket structure **414** can support a mass sensor (not shown) that is designed to weigh the bucket assembly (not shown), drive train (not shown), heat plate (not shown), and other components that free float within OMPA **200** between liner structure **310** and mass bracket structure **414**. The mass sensor can measure the mass of the free floating components. This is in contrast with other systems that measure the weight of the entire unit (e.g., by placing weight sensors in the feet structures supporting the device). The mass sensor arrangement of embodiments discussed herein can be less susceptible to heat, errors, zeroing issues, and other issues, and therefore can provide more accurate readings.

[0123] Linkage rod **450** may couple pedal **290** to a hinge pusher (not shown) that causes hinge plate **440** to rotate up and down depending on whether peal **290** is depressed. Hinge bracket **442** may be secured to liner structure **310** and provides support for enabling hinge plate **440**, the hinge pusher (not shown), and the bezel (not shown) to rotate. If desired, the user may, after depressing pedal **290**, or by manually lifting lid **204** and/or bezel **205**, push lid **204** and/or bezel **205** to a locked position that keeps lid **204** and/or bezel **205** in an open locked position even if pedal **290** is not depressed. A detent structure embedded in hinge bracket **442** may interface with hinge plate **440** and/or bezel **205** to cause the lid and bezel to remain in a fixed open position.

[0124] Liner structure **310** resides in the top portion of the OMPA and provides support for the lid and lid associated components, a first fan and associated components (e.g., heater and manifold), openings **308**, untreated air inlet port **312**, and various other components that are attached to liner structure **310**. In particular, FIG. **4**H shows interface region **310***a* configured to receive air intake manifold **431** and interface region **310***b* configured to receive fan **432**. FIG. **4**I shows interface region **310***c* configured to receive exhaust airflow adapter **421**.

[0125] Referring now to FIGS. **5**A-**5**E, various perspective views, a top view, and cross-sectional views of liner structure **310**, heat plate **502**, overmold structure **510**, mass bracket **414**, load cell **544** (e.g., mass sensor), drivetrain **550**, and other components are shown. An insulation layer **504** (shown in FIG. **5**D) may exist between heat plate **502** and drivetrain **550** to protect drivetrain **550** and other components from relatively high hot plate temperatures (e.g., temperatures exceeding 90° C.). Heat plate **502** can include two through-holes **502***a* and **502***b* through which parts of drivetrain **550** exist. Heat plate **502** may be constructed to sit on top of a cutout portion of overmold structure **510** and on top of insulation layer **504**. In some embodiments, heat plate **502** may have registration members that align with reciprocal registration structures of insulation layer **504**.

[0126] The interior volume of liner structure **310** is configured to accept a bucket assembly or the processing chamber and retain the bucket assembly therein during operation of the OMPA. When the bucket assembly is inserted into liner structure **310**, a bottom surface of the bucket assembly directly engages heat plate **502**, registration members fit around respective portions of heat plate **502**, and impeller couplers engage reciprocal couplers **553** and **554** that are connected to drivetrain **550**. Heat plate **502** imparts heat into the bucket assembly during different stages of an OMPA processing cycle. Drivetrain **550** causes driveshafts **551** and **552** to rotate respective couplers **553** and **554**, which cause the impeller couplers to rotate, which then cause impeller tree assemblies to rotate within the bucket assembly. Impeller tree assemblies are at least partially responsible for mixing, grinding, and cutting OMPA input.

[0127] Drivetrain **550** can include driveshafts **551** and **552**, couplers **553** and **554**, a gearbox **555**, and motor **558**. Drivetrain **550** can include various seals to prevent air leaks and/or moisture and debris penetration. For example, referring to FIG. **5**E, seal **506** (e.g. a Nidec seal) may exist in through-holes **502***a* and **502***b* to prevent air from passing through heat plate **502** via couplers **553** and **554**. Drivetrain **550** can be positioned below heat plate **502**, insulation layer **504**, and liner structure **310**.

[0128] Liner structure **310**, taken alone as an independent part, has a top aperture **501** and a bottom aperture **503** (shown in FIG. **5**D). That is, liner structure **310** has an elliptical shaped through-hole when considered as an independent part. Bottom aperture **503** is sealed substantially airtight with a combination of heat plate **502**, overmold structure **510**, and various components of drivetrain **550**. Overmold structure **510** surrounds the periphery of bottom aperture **503** and has a cutout to accommodate heat plate **502**. An airtight seal may be achieved by gasket **511** that exists between liner structure **310** and overmold structure **510**. Heat plate **502** may sit on top of the cutout and an airtight seal can be established by gasket **505** existing between overmold structure **510** and heat plate **502**. Additional airtight seals **506** can exist around couplers **553** and **554** and within through-holes **502***a* and **502***b*. Maintaining an airtight seal at the bottom of liner structure **310** may be necessary to ensure untreated air is property treated by the air treatment system and that any air that is treated by the air treatment system is not fed back into liner structure **310** as undesired feedback. Furthermore, maintaining the airtight seal also supports operation of a mass sensor (e.g., mass sensor **544**) responsible for measuring the mass of any contents contained in the bucket assembly. In some embodiments, the mass sensor may be sensitive to pressure changes within housing **602**/bucket assembly **600**, therefore it is desirable to prevent air leakage out of bucket assembly **600** or the bottom of liner structure **310** to eliminate any potential for errant mass sensor readings.

[0129] Heat plate **502** is secured to insulation layer **504**. Insulation layer **504** is secured to drivetrain **550**. A portion (e.g., a loading structure) of drivetrain **550** is secured to a first mounting portion of load cell **544**. A second mounting portion of load cell is secured to mass bracket structure **414**. Load cell **544** can function as a cantilevered strain gauge in which the second mounting portion is anchored to mass bracket structure **414** and the first mounting portion supports the mass of drivetrain **550**, insulation layer **504**, heat plate **502**, overmold structure **510**, and the bucket assembly (when said bucket assembly is inserted into liner structure **310**). In this configuration, the combination of drivetrain **550**, insulation layer **504**, heat plate **502**, overmold structure **510**, and the bucket assembly (when inserted into liner structure **310**) float relative to liner structure **310** and mass bracket structure **414**, and load cell **544** can measure the mass thereof. For example, when the bucket assembly is inserted into liner structure **310** and a user adds OMPA input, load cell **544** can detect how much mass is added.

[0130] FIG. 5F shows multiple views of drivetrain coupler **553** or **554** according to an embodiment. Coupler **553** is designed to receive a reciprocal impeller coupler (e.g., coupler **615** of FIG. 7). Coupler **553** can have a cylindrical shape having cavity portion **553***a*, through-hole **553***b* (e.g., shaped as a square), three rib structures **553***c* that are each spaced 120 degrees away from each other within cavity portion **553***a*. Each rib structure **553***c* can span the depth of cavity portion **553***a* such that it extends from bottom wall **553***d* to aperture **553***e*. In addition, each rib structure **553***c* has a cuboid portion **553***f* and a partial pyramid portion **553***g* that are both integrally formed as part of the interior wall of cavity portion **553***a*. Cuboid portion **553***f* spans from bottom wall **553***d* and transitions to partial pyramid portion **553***g*. Partial pyramid portion **553***g* can terminate at aperture **553***e*. In addition, partial pyramid portion **553***g* can guide a respective impeller coupler into place when the bucket assembly is inserted into the liner structure. Coupler **553** or **554** can be constructed from a metal such as stainless steel or aluminum.

[0131] FIG. 5G shows multiple views of another drivetrain coupler **580** according to an embodiment. Coupler **580** can have a cylindrical shape having cavity portion **583***a*, through-hole **583***b* (e.g., shaped as a square), three rib structures **583***c* that are each spaced 120 degrees away from each other within cavity portion **583***a*. Each rib structure **583***c* can span the depth of cavity portion **583***a* such that it extends from bottom wall **583***d* to beyond aperture **583***e*. In addition, each rib structure **583***c* has a cuboid portion **583***f* and a partial pyramid portion **583***g* that both integrally formed as part of the interior wall of cavity portion **583***a*. Cuboid portion **583***f* spans from bottom wall **583***d* and transitions to partial pyramid portion **583***g*. Partial pyramid portion **583***g* can extend beyond side wall **581** and aperture **583***e*. In addition, partial pyramid portion **583***g* can guide a respective impeller coupler into place when the bucket assembly is inserted into the liner structure. Coupler **580** can be constructed from a metal such as stainless steel or aluminum. Drivetrain coupler **580** is similar to couplers **553/554** but has reduced side wall **581** height such that partial pyramid portions **583***g* of each rub structure **583***c* extend beyond side wall **581** and aperture **583***e*. The configuration of coupler **580** can result in more tooth on tooth interfacing when the bucket is inserted into the OMPA, thereby providing for more consistent bucket alignment as the partial pyramid portions of each rib guide the respective ribs of the bucket couplers into place. The use of coupler **580** or coupler **553**, in conjunction with an autorotation feature, can ensure that the bucket and drivetrain couplers are properly seated with respect to each other when the bucket is inserted into the OMPA.

[0132] Another core aspect of the OMPA is providing a processing chamber or bucket assembly that not only allows OMPA input to be processed in a consistent, predictable manner, but is also easy to use by various individuals. FIG. 6A shows a perspective view of a bucket assembly **600** that includes a metal housing **602** (e.g., a receptacle or bucket) designed to fit securely within the liner structure of an OMPA. Housing **602** has an interior volume defined by a bottom wall **602***a* and peripheral wall **602***b*. Additional details of housing **602** features are shown and described in connection with FIGS. 7A-7E. Bucket assembly **600** is preferably user-removable from the OMPA. For example, bucket assembly **600** may be placed on the counter during food preparation and then reinstalled in the durable housing afterwards. Bucket assembly **600** may rest on feet members **680** when sitting on a counter or other surface. Feet members **680** may also serve as registration elements to assist in aligning bucket assembly **600** on top of heat plate **502**. As another example, bucket assembly **600** may be removed from the durable housing after production of the product is complete to allow for easier handling (e.g., disposal, storage, or use) of the product.

[0133] Generally, bucket assembly **600** is designed so that, when installed in the liner structure, OMPA input can be easily deposited by simply opening the lid of the OMPA. Bucket assembly **600** can include an aperture **604** along its top end that is sized to allow for various forms of OMPA input. In some embodiments, aperture **604** can have elliptical form that is 150-500 millimeters (mm) (5.91-19.68 inches) in length and 150-300 mm (5.90-11.81) in width. For example, aperture **604** may have a length of roughly 350 mm (13.78 inches) and a width of roughly 175 mm (6.89 inches). Metal housing **602** may have three-dimensional ellipsoid form characterized as having two half columnar-like structures joined together by two planar walls. In some embodiments, metal housing **602** can have a pill shape. The width between the two planar walls and the diameter of the inside surface of the columnar structures can range between (X and Y), the length between the inside surfaces of both columnar-like structures can range between (X and Y), and the height from a bottom wall of housing **602** and the top planar surface of aperture **604** can range between (X and Y). For example, metal housing **602** may have an overall internal length of roughly 320 mm (12.60 inches), an overall internal width of roughly 150 mm (5.9 inches), and an internal height of roughly 240 mm (9.4 inches).

[0134] Moreover, bucket assembly **600** may be designed to be easily washable (e.g., in a dishwasher or wash in the sink). Thus, the bucket assembly **600** may be constructed of one or more durable materials that can withstand prolonged exposure to OMPA input in various states (e.g., moist and dry), as well as repeated washings. Examples of durable materials can include aluminum and stainless steel, aluminum and steel cladding, plastics, ceramics, and other metals.

[0135] As shown in FIG. 6A, handle **606** may be pivotably connected to opposing sides of bucket assembly **600**. Such a design allows handle **606** to be pivoted downward when bucket assembly **600** is installed in the structural body of the OMPA. Handle **606** may be designed to not impede the deposition of OMPA input into bucket assembly **606**. Handle **606** may be designed to allow a user to easily carry bucket assembly **606**, with either one or two hands. To ensure that bucket assembly **600** can be transported without issue, it may be designed so that, when loaded with product, the weight does not exceed a threshold. The threshold may depend on the size of metal housing **602** and/or the material (s) from which the metal housing **602** and other components of bucket assembly **600** are made, though it may be desirable to limit the weight to no more than 10-25 pounds (and preferably 15-20 pounds).

[0136] FIG. 6B includes a top view of bucket assembly **600**. The following discussion may reference one or both of FIGS. 6A and 6B. This view shows metal housing **602**, handle **606** pivotably connected thereto, first impeller tree **610**, second impeller tree **630**, first blade array **650**, second blade array **660**, and deflectors **670**. First impeller tree **610**, second impeller tree **630**, first blade array **650**, second blade array **660** may collectively represent one or more grinding mechanisms responsible for cutting, crushing, grinding, mixing, or otherwise separating OMPA input deposited into housing **602** into fragments. First impeller tree **610** and second impeller tree **630** are part of respective impeller tree assemblies that secure impeller trees **610** and **630** to metal housing **602** and to respective drive shafts of a drivetrain. The drivetrain can include a gearbox and a motor that rotate the drive shafts, thereby causing first impeller tree **610** and second impeller tree **630** to rotate about respective vertical axes within bucket **602**. Blade arrays **650** and **660** are arranged vertically within bucket **602** and can both be positioned on the same side of bucket **602** or can be positioned on opposite sides of bucket **602**. In some embodiments, it may be preferred to mount blade arrays **650** and **660** along a curved portion of the peripheral wall of bucket **602**. As first impeller tree **610** and second impeller tree **630** rotate, the cutting members that extend radially away from the respective vertical axes pass by their associated blade array (e.g., the cutting members of first impeller tree **610** pass by first blade array **650** and the cutting members of second impeller tree **630** pass by second blade array **660**). Each cutting member may have a u-shaped groove or channel that is bisected by a blade associated with one of blade arrays **650** and **660** during each rotation of the impeller trees. In one embodiment, bucket **602** may be dimensioned and the vertical axis positions of the impeller trees may be such that none of the cutting members associated with impeller tree **610** overlap any of the cutting members associated with impeller tree **630** during any point of the rotations thereof. In this embodiment, despite the existence of a cutting member free zone in the middle portion of bucket **602**, the configuration of one or more cutting members and a size of the free zone promote cross-flow of OMPA input/OMPA output from one side (e.g., left side) to the other side (e.g., right side) of bucket **602**. In some embodiments, the flow of material contained in bucket **602** can resemble the figure eight (8) or infinity (∞) shape when impeller trees **610** and **630** are both rotating (e.g., in the same direction). Moreover, as will be explained in more detail below, the configuration of one or more cutting members is designed to pull material down to the bottom of bucket **602**. The downward migration of material may be preferable because higher leverage cutting members exist near the bottom of bucket **602**. Higher leverage cutting members have more cutting, grinding, and shearing power than lower leverage cutting members and thus have a greater capacity to break up relatively harder objects (e.g., avocado pits, bones, shells, etc.). In some embodiments, a cutting member of one impeller may be configured to extend beyond a middle portion of bucket **602** such that it overlaps at least one of the cutting members of the other impeller.

[0137] Impellers **610** and **630** may rotate at the same or different rates of rotation and at the same direction or opposing directions. The design configuration of bucket assembly **600** may enable a user to manually rotate one or both impellers or to remove and re-insert one or both impellers (e.g., to enable better exfiltration of OMPA output from the bucket assembly, to clean, or service). As a potential consequence of the manual rotation or re-insertion of one or more impellers, both impellers may be positioned in a rotation sync that would result in simultaneous cutting member/blade array interactions for every rotation cycle if both impellers spin at a synchronous rotation rate. In one embodiment, impellers **610** and **630** may both rotate in the same direction at any given time but at an asymmetric rotation rate. The asymmetric rate of rotation can ensure that both impellers **610** and **630** are not always simultaneously passing by their respective blade arrays. This limits occurrence of simultaneous matter engagement (e.g., slicing, cutting, grinding) of both impellers with their respective blade arrays. This prevents undue stress on the motor powering the drivetrain and maximizes torque loading for each cutting member/blade array interaction. In other words, it is desirable for only one cutting member to interact with its respective blade array at any given time during the rotation cycle of both impellers. This way, all available motor torque is available to engage in just one cutting member/blade array interaction as opposed to simultaneously distributing motor torque across two separate cutting member/blade array interactions.

[0138] The asymmetric rotation of impellers **610** and **630** can be provided by a gearbox (e.g., part of drivetrain **550**) that is connected to both impellers **610** and **630** and to a motor (also part of drivetrain **550**). The gears in the gear box may be configured such the rotational input provided by the motor is translated into a different rotation speed for each impeller. For example, if one impeller rotates at a rate of X, the other impeller may rotate at rate of Y, where Y is different than X. The difference between X and Y can be relatively small such as 0.1 to 3 percent. The motor may operate under the control of a control system that can run an algorithm that is supplied with a multitude of inputs that can cause the motor to operate differently. For example, at the beginning of an OMPA processing cycle, the motor may operate at a relatively slower speed such that the impellers rotate at a relatively slower rotational rate (e.g., to provide sufficient time to grind and cut OMPA input). After a beginning period of the OMPA processing cycle has come to completion (e.g., after a fixed period of time or one or more sensors indicate that the relatively more difficult grinding and cutting actions are complete), the motor may operate at relatively higher speed such that the impellers rotate at a relatively faster rotational rate (e.g., to promote enhanced mixing and drying of contents contained in bucket **602**). For example, both impellers may rotate at a rate of 1-2 rotations per minute (RPM), but with a difference of 0.25-1 RPM between the two impellers. As a specific example, one impeller may rotate at a rate of 1.2 RPMs, while the other rotates at 1.6 RPMs.

[0139] FIG. **6**C shows a bottom view of bucket assembly **600**, which shows housing **602**, heat plate interfacing surface **603***a*, impeller assembly **610***a*, impeller assembly **630***a*, and feet members **680**. Heat plate interfacing surface **603***a* is designed to sit directly on top of heat plate **502**. Through-holes **610***b* and **630***b* exist in heat plate interfacing surface **603***a* to allow for respective portions of impeller assemblies **610***a* and **630***a* to extend through the bottom of housing **602** to interface with respective drivetrain components. The portions of impeller assemblies **610***a* and **630** extending through through-holes **610***b* and **630***b* extend beyond a plane of interface surface **603***a* but may not extend beyond feet members **680**. This way, when bucket assembly **600** is removed from the OMPA and set on a counter or floor, feet members **680** fully support bucket assembly **600** without any stress being applied to impeller assemblies **610***a* and **630***a*. This spatial relationship is shown more clearly in FIGS. **6**D-**6**F, discussed below. As also shown in FIG. **6**C, feet members **680** are shown to have a semi-circular shape and are mounted to opposite ends of housing **602**. The semi-circular shape of feet members **680** resemble the semi-circular shape of the ends of housing **602**. If desired, feet members **680** can form a perimeter that completely surrounds surface **603***a*.

[0140] FIG. **6**D shows a side view of bucket assembly **600** with housing **602** shown in a hidden configuration. This view does show that no portion of impeller assemblies **610***a* and **630***a* extend beyond feet members **680**. The other components shown in FIG. **6**D are self-explanatory. FIG. **6**E shows a cross section of bucket assembly **600** with emphasis on impeller **630** and blade array **660**. FIG. **6**F shows a cross section of bucket assembly **600** with emphasis on impeller **610** and blade array **650**. Both FIGS. **6**E and **6**F show deflectors **670**, feet members **680**, as well as interior surfaces of metal housing **602**. Deflectors **670** are designed to prevent contents contained in the bucket from splashing up and over the sidewall of housing **602**. Deflectors **670** are shown to span the long sides of housing **602**. This is merely illustrative. If desired, a deflector member may span the entire inside surface of housing **602**. As another example, additional deflectors may be added along a portion of the entirety of the curved portions of housing **602**. As shown, metal housing **602** has a slight convex shape where the aperture is larger than the bottom wall. Moreover, impeller coupling member **615** and impeller coupling member **635** extend through the bottom wall of housing **602** but do not extend beyond feet members **680**.

[0141] In FIGS. **6**D and **6**E, it is apparent that during a rotation of impeller **630**, cutting member **642** passes by or interfaces with blade **662**, integrated cutting and paddle member **644** passes by blade **664**, and cutting member **646** passes by blade **666**. During each rotation, blades **662**, **664**, and **666** can intersect a gap existing within respective members **642**, **644**, and **646**. An interaction of organic matter and one of the of member/blade combination can result in cutting, grinding, or splitting thereof. Each cutting member may also mix and agitate organic matter contained in housing **602**. Integrated cutting and paddle member **644** may have enhanced mixing capacity relative to cutting members **642** and **646** due to the paddle configuration of member **644**. The paddle configuration of member **644** is designed to pull or push organic matter downward towards the bottom surface of housing **602** during rotations thereof. A more detailed explanation of each cutting member is discussed below. It is desirable to push matter down to the bottom surface so that the higher leverage/stronger cutting members (e.g., member **646** and/or cutting member **626**) can engage in grinding/cutting work. Moreover, cutting member **646** can include one or more bottom wall scrapers that are designed to break up and redistribute any organic matter that is resting on the bottom wall within the circular path of the bottom wall scrapers. In addition, the bottom wall scrapers can also serve as treads or plows to facilitate rotational movement of cutting member **646** through and over organic matter residing on or near the bottom wall of housing **602**.

[0142] As also shown FIGS. **6**D and **6**F, during a rotation of impeller **610**, integrated cutting and paddle member **624** passes by blade **654** and cutting member **626** passes by blade **656**. During each rotation, blades **654** and **656** can intersect a gap existing within respective members **624** and **626**. An interaction of organic matter and one of the of member/blade combination can result in cutting, grinding, or splitting thereof. Each cutting member may also mix and agitate organic matter contained in housing **602**. Integrated cutting and paddle member **624** may have enhanced mixing capacity relative to cutting member **626** due to the paddle configuration of member **624**. The paddle configuration of member **624** is designed to pull or push organic matter downward towards the bottom surface of housing **602** during rotations thereof. A more detailed explanation of each cutting member is discussed below. It is desirable to push matter down to the bottom surface so that the higher leverage/stronger cutting members (e.g., member **626** and/or cutting member **646**) can engage in grinding/cutting work. Moreover, cutting member **626** can include one or more bottom wall scrapers that are designed to break up and redistribute any organic matter that is resting on the bottom wall within the circular path of the bottom wall scrapers. In addition, the bottom wall scrapers can also serve as treads or plows to facilitate rotational movement of cutting member **626** through and over organic matter residing on or near the bottom wall of housing **602**.

[0143] The relative heights of each cutting member are now discussed. As shown, impeller **610** has two cutting members **626** and **624** that have center lines that exist at heights H**1** and H**3**, respectively (from the bottom wall). Heights H**1** and H**3** also correspond to the centerlines of blades **656** and **654**, respectively. Impeller **630** has three cutting members **646**, **644**, and **642** that have center lines that exist at heights H**1**, H**2**, and H**4**, respectively (from the bottom wall). Heights H**1**, H**2**, and H**4** also correspond to the centerlines of blades **666**, **664**, and **662**, respectively. Heights H1, H**2**, H**3**, and H**4** all have different numerical values. Cutting members **626** and **646**, and blades **656** and **666** can all correspond to height H**1**. As a result, cutting members **626** and **646** can rotate along the same plane as each other. Integrated paddle and cutting members **654** and **664** may be slightly offset with respect to each other as shown, with member **624** existing at height H**3**, and cutting member **644** existing at height H**2**. This difference in height may be 15 mm or range between 5-30 mm, depending on internal height of the metal housing, and can promote cross bucket mixing and downward pushing of organic matter. Cutting member **642** rotates at height H**4** and is designed to chop relatively large OMPA input (e.g., corn) or other OMPA input sitting on top of other organic matter existing in bucket assembly **600**.

[0144] Another dimension within bucket assembly **600** is depth D**1** from the planar surface of the aperture opening of housing **602** to the center line of cutting member **642**. In some embodiments, it may be desirable to maintain a minimum depth D**1** to minimize upward splashing of contents and to promote downward pushing of material to the bottom wall. It should be understood that the depths of each cutting member and blade relative to the top of housing **602** can be determined by doing simple math with D**1** and height values H**1**-H**4**. For example, the depth of cutting member **646** can be determined by the following formula: D**1**+H**4**−H**1**. As another example, the depth of cutting member **624** can be determined by the following formula: D**1**+H**4**−H**3**.

[0145] FIG. **6**G shows multiple views of impeller coupling **615** or **635** according to an embodiment. For the purposes of this discussion, the impeller coupler will be referred to as impeller coupler **615**. Impeller coupler **615** has cylindrical portion **615***a* that forms the outer dimension thereof. The top part of cylindrical portion **615***a* may have cavity **615***b* dimensioned to fit around a distal end of the extension portion of an impeller tree (as shown in FIG. **7**). Through-hole **615***c* may exist a center axis of coupler **615** and configured to receive a fastener to secure coupler **615** to the impeller tree (via the extension portion). The bottom side of cylindrical portion **615** can include tubular structure **615***e* that extends from surface **615***d* to a first fixed distance and includes through-hole **615***c*. Also extending from surface **615***d* are three tooth members **615***f* that are integrally formed with tubular structure **615***e* and are arranged at 120 degrees with respect to each other. Tooth members **615***f* can extend from surface **615***d* a second fixed distance that is greater than the first fixed distance associated with tubular structure **615***e*. Tooth members **615***f* can include a cuboid portion **615***g* and partial pyramidal portion **615***h* (e.g., both of which exhibit similarities to rib structure **553***c*. Partial pyramidal portion **615***h* can help align impeller **615** with a respective drivetrain coupler when the bucket assembly is inserted into the liner. The side walls of cuboid portion **615***g* are designed to engage a reciprocal side wall of cuboid portion **553***g* when couplers **553** and **615** are mated together. In some embodiments, tooth members **615***f* can touch or be designed to be offset by a fixed gap distance from bottom wall **553***d* of coupler **553** when couplers **553** and **615** are coupled together. Conversely, rib structures **553***d* can touch or be designed to be offset by another fixed gap from surface **615***d* when couplers **553** and **615** are coupled together.

[0146] FIG. **6**H shows several views, including cross-sectional views of impeller coupling **615** engaged with coupler **553**. As shown in the cross-sectional views, each tooth member **615***f* exists between rib structures **553***c*. It should be understood that if impeller coupling **615** is engaged with coupler **580**, the cross-sectional views would be different, but each tooth member **615***f* would exist between rib structures **583***c*.

[0147] It should be noted that the design of the impellers and fixed blade arrays shown and discussed herein are illustrative and that various modifications and configuration can be made. For example, in one embodiment, the bucket assembly can be constructed with just one fixed blade array so that more motor torque is available for cutting actions between an impeller and the lone remaining blade array. FIG. **6**I shows an alternative bucket assembly **690** to bucket assembly **600**. Bucket assembly **690** can be similar to bucket assembly **600**, but eliminates blade array **650** and can modify a shape of impeller **610** to be more conducive mixing to contents contained in the bucket (e.g., integrated cutting and paddle member **624** can be modified to eliminate the cutter element and include a single integrate paddle member). In bucket assembly **690**, impeller **630** is operative to cut and grind in conjunction with blade array **660** and impeller **610***m* is operative to mix and agitate only because there is no blade array/impeller **610***m* interaction. In embodiments that use just one blade array is used in the bucket assembly (e.g., bucket assembly **690**), both impellers may synchronously rotate (because there is no need to avoid dual impeller loading events to ensure maximum distributed cutting torque is available for both impellers—only one impeller is engaged in active cutting with respect to a blade array).

[0148] In some embodiments, when the bucket assembly is inserted into the OMPA, and the insertion thereof is detected, the motor may autorotate the drive couplers **553** and **554** to ensure that impeller couplers **615** and **635** fully seat into respective drive couplers **553** and **554**. Autorotating may prevent couplers from stack interfacing with each in a manner that could potentially prevent the bucket assembly from being seated into its proper insertion position. If, after insertion of the bucket assembly, the couplers stack up on top each other, the bucket assembly may not be fully seated. The autorotation of driver couplers **553** and **554** will enable the impeller couplers **615** and **635** to fall into place to ensure the bucket assembly is properly seated. It should be understood that couplers **553** and **554** can be replaced with coupler **580**.

[0149] FIG. **7** shows an illustrative cross-sectional view of bucket assembly **600** with emphasis on impeller assemblies **610***a* and **630***a*, impeller couplings **615** and **635**, and drive train couplings **775** and **785**. FIGS. **7**A-**7**E show different views of only housing **602**. In particular, FIGS. **7**A and **7**B show different perspective views, FIG. **7**C shows a top view, FIG. **7**D shows a bottom view, and FIG. **7**E shows a cross-sectional view of housing **602**. The following discussion collectively references FIGS. **7** and **7**A-**7**E. Housing **602** has bottom wall **602***a*, peripheral wall **602***b*, aperture **604**, heat plate interfacing surface **702**, and support structures **712** and **732**. Each of these components comprising housing **602** may be die cast as a single unitary structure out of aluminum, steel, or other metal material. Support structures **712** and **732** are ring shaped structures extending upwards from bottom wall **602***a*. Support structure **712** includes through-hole **712***a*, which extends through bottom wall **602***a* and heat plate interfacing surface **702**. Support structure **712** can include bearing retaining cutouts **714** and **715** that are configured to hold bearings **704** and **705** (shown in FIG. **7**). Support structure **712** can include gasket groves **716** and **717** that are configured to retain gaskets **706** and **707** (shown in FIG. **7**). Support structure **732** includes through-hole **732***a*, which extends through bottom wall **602***a* and heat plate interfacing surface **702**. Support structure **732** can include bearing retaining cutouts **734** and **735** that are configured to hold bearings **724** and **725** (shown in FIG. **7**). Support structure **732** can include gasket groves **736** and **737** that are configured to retain gaskets **726** and **727** (shown in FIG. **7**). Though-holes **712***a* and **732***a* can each have a minimum diameter portion configured to accept respective extension members of impellers **610** and **630** and a maximum diameter portion configured to accommodate drivetrain components.

[0150] Referring now specifically to FIG. **7**, the impeller assemblies **610***a* and **630***a* are shown interacting with support structures **712** and **732** and drivetrain components **775** and **785**. Impeller assembly **610***a* can include impeller **610**, impeller coupling **615**, fastener **616**, bearings **704** and **705**, gaskets **706** and **707**, and other components such as spring clips (not shown). Impeller assembly **630***a* can include impeller **630**, impeller coupling **635**, fastener **636**, bearings **724** and **725**, gaskets **726** and **727**, and other components such as spring clips (not shown). Impellers **610** and **630** may be investment cast from a stainless steel into a single integrated body structure. FIGS. **8**A-**8**G and **9**A-**9**G show various views of impellers **610** and **630**, respectively. Although impeller **610** is a single integrated structure, it includes many distinct features. For example, impeller **610** may have a base portion **612**, a telescoping portion **614**, and optional thumb screw member **616**, as shown. Base portion **612** is cylindrical in shape, has a partially hollow internal cavity **612***a* (shown more clearly in FIG. **8**B) with extension member **612***b* existing therein. Base portion **612** is configured to fit over support structure **712**. Extension member **612***b* is designed to be inserted into through-hole **712***a* of support structure **712**. Extension member **612***b* may be supported by bearings **704** and **705**. Gaskets **706** and **707** may each provide a seal between internal cavity **612***a* and an outer surface of support structure **712**. Extension member **612***b* also be coupled to impeller coupler **615** with fastener **616**. Impeller **630** may have a base portion **632**, a telescoping portion **634**, and optional thumb screw member **636**, as shown. Base portion **632** is cylindrical in shape, has a partially hollow internal cavity **632***a* (shown more clearly in FIG. **9**B) with extension member **632***b* existing therein. Base portion **632** is configured to fit over support structure **732**. Extension member **632***b* is designed to be inserted into through-hole **732***a* of support structure **732**. Extension member **632***b* may be supported by bearings **724** and **725**. Gaskets **726** and **727** may each provide a seal between internal cavity **632***a* and an outer surface of support structure **712**. Extension member **632***b* also be coupled to impeller coupler **635** with fastener **636**.

[0151] As also shown in FIG. **7** are parts of the drivetrain. In particular, drivetrain coupler **775** is shown to be interfacing with impeller coupler **615** within the maximum diameter portion of through-hole **712***a*. In one embodiment, impeller coupler **615** can be the male coupler and drivetrain coupler **775** can be the female coupler. In addition, drivetrain coupler **785** is shown to be interfacing with impeller coupler **635** within the maximum diameter portion of through-hole **732***a*. In one embodiment, impeller coupler **635** can be the male coupler and drivetrain coupler **785** can be the female coupler.

[0152] The engagement between impeller assembly **610***a* and support structure **712** and the engagement between impeller assembly **630***a* and support structure **732** are designed to prevent or at least substantially mitigate moisture and debris intrusion into cavities **612***a* and **633***a* and drivetrains **775** and **785**. In addition, these engagements may also assist in maintaining an airtight seal to prevent air transfer through heat plate **502** and overmold structure **510**. The air sealing of various interfaces among liner **310**, overmold structure **510**, heat plate **502**, and drive train couplings are discussed above.

[0153] FIGS. **7**F-**7**J show different view of various blade arrays according to various embodiments. In particular, FIGS. **7**F and **7**G show different views of blade array **660** with blades **662**, **664**, and **666** and FIGS. **7**H and **71** show different views of blade array **650** with blades **654** and **656**. FIG. **71** shows an illustrative side view of either blade array **650** or **660** and which view shows the profile blade geometry. In some embodiments, such as those shown, blades **662** and **664** can be connected by member **663**, blades **664** and **666** can be connected by member **665**, and blades **654** and **656** can be connected by member **653**. Members **653**, **663**, and **665** may be integrally formed with their respective blades of blade arrays **650** and **660**. In addition, members **653**, **663**, and **665** may be curved to match the curvature of the inside surface of metal housing **602**. Members **653**, **663**, and **665** may enhance the structural rigidity of blade array **650** and **660** by distributing any loading force along the length of respective blade arrays **650** and **660**. In contrast, if blade array did not include members **653**, **663**, and **665**, any loading would be borne by each blade (e.g., blade **666**) individually when a cutting member and that blade are jointly cutting or grinding organic matter. In some embodiments, members **663** and **665** may exhibit a tapered shape from one blade to another. For example, member **665** may be wider at blade **666** than at blade **664**. In addition, member **663** may be wider at blade **664** than at blade **662**. In some embodiments, member **653** may be uniform in shape between blades **654** and **656** and not exhibit a tapered shape. The shape and configuration of blades **662**, **664**, **666**, **654**, and **656** can be selected to enable cutting or grinding to be performed when the impellers rotate in both the clockwise and counterclockwise directions. In addition, the contours and radii thereof can minimize matter accumulation thereon during OMPA processing of organic matter.

[0154] FIGS. **8**A-**8**G show different views of impeller **610** according to an embodiment. Impeller **610** may have base portion **612**, telescoping portion **614**, optional thumb screw member **616**, integrated cutting and paddle member **624**, and cutting member **626**. Base portion **612** is cylindrical in shape, has a partially hollow internal cavity **612***a* with extension member **612***b* existing therein. Base portion **612** has dimensions suitable to fit over support structure **712** of metal housing **602** and to accommodate bearings **704** and **705** and gaskets **706** and **707**. Cutting member **626** extends from the outer surface of base portion **612**. Extension member **612***b* includes fastener receptacle **612***c* for receiving fastener **616** to secure impeller coupler **615** thereto. Extension member **612***b* can also include interface features **612***d* for interfacing with reciprocal features of impeller coupler **615**. Telescoping portion **614** extends up from base portion **612** and integrates with optional screw member **616**. Telescoping portion **614** may have a tapered shape where its base is slightly larger than its top. Support arm **614***a* can extend from telescoping portion **614** to interface with integrated cutting and paddle member **624**. Support arm **614***a* be may co-axially aligned with a center cutting axis of member **624** (e.g., aligned with height H**3** of FIG. **6**D). Optional screw member **616** may be triangular in shape and configured to enable a person to use his or her thumb and fingers to rotate impeller **610**, remove impeller **610** from the bucket assembly, and re-insert impeller **610** into the bucket assembly. In some embodiments, when optional thumb screw member **616** is omitted, telescoping member **614** may terminate the top of impeller **610**.

[0155] FIG. **8**F shows the radial distances, R**1** and R**2**, of distal edges of cutting members **624** and **626**, respectively, from a center axis. In some embodiments, R**1** and R**2** may be substantially the same. In other embodiments, R**1** and R**2** can be marginally different such as, for example, 1-3% different. In yet another embodiment, R**1** is greater than R**2**. FIG. **8**F also shows that cutting member **624** is aligned at 180 degrees with respect to cutting member **626** such that both cutting members **626** and **624** are directly opposite of each other. It should be understood that cutting members **626** and **624** can be aligned at another angle with respect to each other such as between 0 and 179.9 degrees.

[0156] Cutting member **626** has a general c-shape with various nuanced features that adorn each of the legs forming part of the c-shape. In particular, cutting member **626** has top leg defined by surfaces **626***a* and **626***b*, a bottom leg defined by surface **626***d* and bottom wall scraper **627**, and curved surface **626***c*. The c-shaped channel of member **626** is formed by surfaces **626***b*-**626***d*. Both the top and bottom legs may extend radially the same distance from a common rotation axis (not shown) of impeller **610**. The shape and configuration of surfaces **626**_a-d_ and bottom wall scraper **627** are designed to enhance cutting action and ability to move through organic matter contained in the bucket. For example, the curved geometry of surface **626**_a_ may promote an ability to move through organic matter, whereas the flat surface geometry of surface **626**_b_ is designed to organic matter. Surface **626**_d_ can be curved to promote movement through organic matter and to push organic matter up a bit to engage with the sharp edges of surface **626**_b_. Bottom wall scraper **627** can be defined by scraper member **627**_a_ and scraper member **627**_b_ that together form a curved channel **627**_c_ existing therebetween. Scrapers **627**_a_ and **626**_b_ both extend towards, but do not touch, bottom surface **602**_a_. In some embodiments, the gap distance, G**1**, between bottom wall **602**_a_ and scraper **627** may range between 0.5 mm and 2 mm. In other embodiments, a gap distance of less than 0.5 mm is possible provided there is no collision with the bottom wall. Scraper members **627**_a_ and **627**_b_ may both exhibit the same curve geometry to ensure that curved channel **627**_c_ is uniform throughout the width of scraper **627**.

[0157] Cutting member **626** has more cutting/grinding power than cutting member **624**. Greater cutting/grinding power is based on physics. Cutting member **626** is located closer to the drivetrain and has less of a moment arm than cutting member **624**.

[0158] Integrated paddle and cutting member **644** includes cutter cavity **944**, which exhibits a c or u shaped profile having a top side and a bottom side, matter redirection member **825** integrally formed with and extending from the top side, and matter redirection member **835** integrally formed with and extending from the bottom side. Cutter channel **824** can have planer surface **824**_a_, curved surface **824**_b_, and planer surface **824**_c_. The gap distance between surfaces **824**_a_ and **824**_c_ can be less than a gap distance between surfaces **626**_b_ and **626**_d_ of cutting member **626** (i.e., G**2**<G**1**). In some embodiments, the gap distances for cutting members **624** and **626** can be the same (e.g., G**1**=G**2**). In some embodiments, the gap distance, G**2**, for cutting member **624** can range between 10 mm and 40 mm depending on the internal height of the metal housing and the Z height (or vertical) position of the cutting member. If desired, in another embodiment, G**1**<G**2**.

[0159] Matter redirection members **825** and **835** can both exhibit the same geometry, but oriented in different directions, with member **825** generally pointing up and member **835** generally pointing down. Member **825** can have deflection surface **825**_a_, which is designed to direct organic matter over cutting member **624** when member **624** is rotating in a first direction, and deflection surface **825**_f_, which is designed to direct organic matter into cutter channel **824** when member **624** is rotating in a second direction. Member **835** can have deflection surface **835**_a_, which is designed to direct organic matter over member **624** when member **624** is rotating in the second direction, and deflection surface **835**_f_, which is designed to direct organic matter into cutter channel **824** when member **624** is rotating in the first direction. For example, during operation of impeller **610** during an OMPA processing cycle, impeller **610** may rotate in a clockwise direction for a fixed period of time and then rotate in a counter-clockwise direction for the same fixed period of time such that rotation direction oscillates after expiry of each fixed period of time. When impeller **610** rotates in the clockwise direction, deflection surface **825**_a_ may tend to direct organic matter upwards such that the matter flows over cutting member **624**, and deflection surface **835**_f_ may tend to direct organic matter upwards to channel **824** and/or deflection surface **825**_a_. When impeller **610** rotates in the counter-clockwise direction, deflection surface **835**_a_ may tend to direct organic matter downwards such that the matter flows towards cutting member **626**, and deflection surface **835**_f_ may tend to direct organic matter downwards to channel **824** and/or deflection surface **835**_a_.

[0160] Deflection surface **825**_a_ can be a multi-contoured surface having a general angle of **826** relative to planar surface **824**_a_. The general angle **826** can range between 40-50 degrees, and in some embodiments, can be 45 degrees. Deflection surface **825**_a_ can have different surface contours **825**_b_, **825**_c_, **825**_d_, and **825**_e_ that are designed to promote deflection of organic matter past member **624**. Deflection surface **825**_f_ can have different surface contours **825**_g_, **824**_h_, and **825**_i_ that are designed to direct organic matter into cutter channel **824**. The surface contours of surface **825**_f_ may be designed to prevent mitigate collection of organic matter in the approximate 90 degree curve. The same contours of defection surfaces **825**_a_ and **825**_f_ can apply to the defection surfaces **835**_a_ and **835**_f_, respectively.

[0161] FIGS. **8**H-**8**J show impeller **810** with a different scraper **887** according to an embodiment. Impeller **810** is essentially the same as impeller **610** but with a different scraper geometry. Scraper **887** is integrated with the lower cutting portion of cutting member **626** and resembles a double sided plow designed to push organic matter upwards into cutting member **626** when impeller **810** is rotating. Scraper **887** can include plow portion **887**_a_ and plow portion **887**_b_ that extend from both sides of lower cutting portion **886** of cutting member **626**. During rotation of impeller **810**, the leading edge of either plow portion **887**_a_ or plow portion **887**_b_ can impact any existing OMPA input and cause that OMPA input to slide up the plow portion to cutting member **626**. The bottom surfaces of plow portions **887**_a_ and **887**_b_ and lower cutting portion **886** may be substantially flat. This flat portion may be positioned parallel to, but above, the bottom wall of the metal bucket housing by a fixed distance (e.g., 1-2 mm). The upper surface of plow portions **887**_a_ and **887**_b_ may have a curved surface, a flat planer surface, a multi-curved surface, a curvilinear surface, or any other suitable geometry. In some embodiments, the overall width of scraper **887** may be approximately the same width dimension as integrated paddle and cutting member **624**.

[0162] FIGS. **9**A-**9**H show different views of impeller **630** according to an embodiment. Impeller **630** may have base portion **632**, telescoping portion **634**, optional thumb screw member **636**, cutting member **642**, integrated cutting and paddle member **644**, and cutting member **646**. Base portion **632** is cylindrical in shape, has a partially hollow internal cavity **632**_a_ with extension member **632**_b_ existing therein. Base portion **632** has dimensions suitable to fit over support structure **732** of metal housing **602** and to accommodate bearings **724** and **725** and gaskets **726** and **727**. Cutting member **646** extends from the outer surface of base portion **632**. Extension member **632**_b_ includes fastener receptacle **632**_c_ for receiving fastener **636** to secure impeller coupler **635** thereto. Extension member **632**_b_ can also include interface features **632**_d_ for interfacing with reciprocal features of impeller coupler **635**. Telescoping portion **634** extends up from base portion **632** and integrates with optional screw member **636**. Telescoping portion **634** may have a tapered shape where its base is slightly larger than its top. Support arm **634***a* can extend from telescoping portion **634** to interface with integrated cutting and paddle member **644**. Support arm **634***a* be may co-axially aligned with a center cutting axis of member **644** (e.g., aligned with height H**2** of FIG. **6**D). Support arm **634***b* can extend from telescoping portion **634** to support cutting member **642**. Support arm **634***b* may be co-axially aligned with a center cutting axis of member **642** (e.g., aligned with height H**1** of FIG. **6**D). Optional screw member **636** may be triangular in shape and configured to enable a person to use his or her thumb and fingers to rotate impeller **630**, remove impeller **630** from the bucket assembly, and re-insert impeller **630** into the bucket assembly. In some embodiments, when optional thumb screw member **636** is omitted, telescoping member **634** may terminate the top of impeller **630**.

[0163] FIG. **9**G shows the radial distances, R**3**, R**4**, and R**5** of distal edges of cutting members **644**, **646** and **642**, respectively, from a center axis. In some embodiments, R**3** and R**4** may be substantially the same. In other embodiments, R**3** and R**4** can be marginally different such as, for example, 1-3% different. In yet another embodiment, R**3** is greater than R**4**. In some embodiments R**1** may be the same as R**3** and R**2** may be the same as R**4**. In some embodiments, R**5** may be greater than R**3** and R**4** (and R**1** and R**2**). For example, R**5** may be 5-10% longer than R**3**. FIG. **9**G also shows that cutting member **644** is aligned at 180 degrees with respect to cutting member **646** such that both cutting members **646** and **644** are directly opposite of each other. Cutting member **642** may be aligned somewhere between 0.1 and 179.0 degrees with respect to cutting member **644** or cutting member **646**. In particular, angle **901** between cutting members **646** and **642** can be between 1 and 90 degrees, between 10 and 60 degrees, between 25 and 55 degrees, between 35 and 45 degrees, or between 37 and 43 degrees.

[0164] Cutting member **646** may have the same general c-shape as cutting member **626** and therefore includes the various nuanced features that adorn each of the legs forming part of the c-shape. Cutting member **646** also includes bottom wall scraper **647**, which is similar to bottom wall scraper **627**. The same attributes of cutting member **626** apply to cutting member **646** and therefore will not be repeated. That is, cutting member **646** can have the same surface geometries and bottom wall scraper as those existing in cutting member **626**. For example, the gap distance between the legs can be the same as those in cutting member **626**.

[0165] Cutting member **646** has more cutting/grinding power than cutting member **644** and cutting member **642**. Greater cutting/grinding power is based on physics. Cutting member **646** is located closer to the drivetrain and has a shorter sweep radius than cutting member **642**. As a result, cutting member **646** has less of a moment arm than cutting member **642**.

[0166] Integrated paddle and cutting member **644** includes cutter channel **924**, which exhibits a c or u shaped profile having a top side and a bottom side, matter redirection member **925** integrally formed with and extending from the top side, and matter redirection member **935** integrally formed with and extending from the bottom side. Cutter channel **924** and redirection members **925** and **935** may exhibit the same shape and geometries as those previously described in connection with cutting member **624**. For example, matter redirection members **925** and **935** can both exhibit the same geometry as the redirection members of cutting member **624**. As such, when impeller **630** rotates, cutting member **644** can move/direct organic matter similarly to how cutting member **624** can move/direct organic matter. The gap distance of channel **924** be the same as the gap distance in cutting member **624**. In some embodiments, the gap distance for cutting member **624** can range between 10 mm and 40 mm depending on the internal height of the metal housing and the Z height (or vertical) position of the cutting member.

[0167] Cutting member **642** may have a general c shape including two leg portions **642***a* and **642***c* joined together with curved portion **642**, wherein the curved portion is integrated with support arm **634***b*. Cutting member **642** may be designed to cut relatively tall objects that are inserted into the bucket, such as, for example, corn cobs, celery stalks, potatoes, etc. Channel **642***d* is formed with interior surface **642***ai*, curved surface **642***bi*, and interior surface **642***ci*. Interior surfaces **642***ai* and **642***ci* can have planer surfaces, similar to the planer surfaces of the leg portions of cutting member **644**. Exterior surfaces **642***ae* and **642***ce* can be substantially flat with curved edges, as shown. The gap distance, D**1**, between interior surfaces **642***ai* and **642***ci* can range between 10 mm and 40 mm. Gap distance, D**1**, can be larger than gap distances, D**2** and D**3**, of respective cutting members **644** and **642**. In some embodiments, D**1**>D**3**>D**2**. In some embodiments, D**2**=G**2** and D**3**=G**1**.

[0168] FIGS. **9**I-**9**K show impeller **930** with a different scraper **987** according to an embodiment. Impeller **930** is essentially the same as impeller **630** but with a different scraper geometry. Scraper **987** is integrated with the lower cutting portion of cutting member **626** and resembles a double sided plow designed to push organic matter upwards into cutting member **646** when impeller **930** is rotating. Scraper **987** can include plow portion **987***a* and plow portion **987***b* that extend from both sides of lower cutting portion **986** of cutting member **646**. During rotation of impeller **930**, the leading edge of either plow portion **987***a* or plow portion **987***b* can impact any existing OMPA input and cause that OMPA input to slide up the plow portion to cutting member **646**. The bottom surfaces of plow portions **987***a* and **987***b* and lower cutting portion **986** may be substantially flat. This flat portion may be positioned parallel to, but above, the bottom wall of the metal bucket housing by a fixed distance (e.g., 1-2 mm). The upper surface of plow portions **987***a* and **987***b* may have a curved surface, a flat planer surface, a multi-curved surface, a curvilinear surface, or any other suitable geometry. In some embodiments, the overall width of scraper **987** may be approximately the same width dimension as integrated paddle and cutting member **644**.

[0169] Grinding mechanisms (and the power available to those grinding mechanisms) may govern the types of OMPA input that can be handled by a given OMPA. Generally, stronger grinding mechanisms in combination with more power will allow heavier duty OMPA input (e.g., bones) to be handled without issue. Accordingly, different embodiments of OMPA could be designed for residential environments (e.g., with less power and weaker grinding mechanisms) and commercial environments (e.g., with more power and stronger grinding mechanisms).

[0170] In some embodiments, the bucket assembly **600**, and more particularly, housing **602** is thermally conductive in its entirety and can convey heat from heat plate **502** to the OMPA input. As heat plate **502** heats up housing **602**, the heat may radiate up the peripheral walls of the bucket. The heated bucket, coupled with heated or ambient temperature inlet air, can promote drying of OMPA input contained in the bucket. An OMPA processing algorithm can control the operation of the impellers, the heat plate, inlet fan speed, and inlet heater temperature, among controllable features to convert OMPA input to OMPA output. Heat plate **502** may be outfitted with one or more sensors (e.g., thermistors) to detect the temperature of the heat plate. In some embodiments, a temperature based cutoff switch may be used to turn off heat plate **502** to prevent thermal runaway.

[0171] When the bucket assembly **600** is installed within liner structure **310**, heat plate facing surface **603***a* interface with heat plate **502** and impeller couplers engage with respective drivetrain couplers. The bucket assembly engagements are mechanical, self-registering, and universal. There are no electrical connections required with inserting bucket assembly **600** into the OMPA. The impeller coupling and drivetrain coupling designs are such that they self-register with each other during the insertion process. The mechanical registrations are universal in that the bucket assembly can be inserted in any orientation (e.g., impeller **610** can be on the left side or the right side).

[0172] A mass sensing system may be incorporated into the OMPA so that mass measurements can be made throughout an organic matter processing cycle or anytime the bucket is present within the OMPA. The mass sensing system may include one or more mass sensors such as, for example, a strain gauge mass sensor. The mass sensor included in the OMPA may continually or periodically output measurements that can be used to calculate, infer, or otherwise establish the total weight of the bucket **602** (including any OMPA input stored therein). These measurements can be communicated to a controller (e.g., controller **110** of FIG. **1**). The controller may determine how to control other components of the OMPA (e.g., its drying and grinding mechanisms) based on these measurements. For example, the controller may determine how long to perform high intensity processing based on the rate at which the weight lessens due to loss of moisture. Mass sensing may play an important role in ensuring that the OMPA can dynamically react to changes in the state of the OMPA input.

[0173] As shown in FIGS. **6**A and **6**B, the cavity defined by the interior surface of the bucket **602** may be symmetrical across the longitudinal and latitudinal planes defined therethrough. For reference, the term "latitudinal plane" may be used to refer to the plane that is substantially parallel to the handle **606** while extended upward as shown. Meanwhile, the term "longitudinal plane" may be used to refer to the plane that is substantially orthogonal to the latitudinal plane. For example, the cavity may be elliptical in shape with a bottom wall and a peripheral wall extending therefrom. The usable value of the bucket may be around 7 liters, which is less than the entire volume of the bucket because the user should empty the bucket when the OMPA output reaches or approaches a designated fill line. The fill line may be set at a height of 60-70 percent the overall internal height of the bucket. In one embodiment, the fill line may be set at a height of around 155 mm from the bottom wall. One advantage of bucket assembly is that is relatively lightweight, sufficiently compact to fit into a convention residential sink, and constructed from durable materials that can withstand high temperatures of a dishwasher, for example. The bucket assembly does not include the weight of the drivetrain (e.g., the gears and motor), the heat plate, or other components.

[0174] An important aspect of increasing adoption is that the OMPA should be easily deployable and operable. The component with which many users will interact most frequently is the lid (e.g., lid **204** of FIG. **2**A). Accordingly, it is important that the lid be easy to use but also offer some functionality. As an example, a user may not only be able to open the lid with her hands, but also by interacting with a mechanical pedal switch that is accessible along the front side of the OMPA. Depressing the pedal causes lid **204** to open. A mechanical linkage connecting the pedal to the lid can span the vertical height of the OMPA. This linkage can include features that provide a pleasant lid opening experience for the users. For example, the lid opening event can be characterized as having a rapid initial angular velocity but as the lid reaches a certain percentage of a fully open lid angle, the angular velocity can be gradually ramped down until the fully open lid angle is reached. An overtravel mechanism may be used to prevent overtravel and bounce back of the lid during opening. When the pedal is released, the lid can "soft" close. A dampener can be used to impart the soft close. A user may be able to manually lift the lid without depressing the pedal. The user may also be able to lock back the lid, if desired, by pressing the lid farther back to engage lid lock detents that enable the lid to lock back.

[0175] The lid may be controllably lockable, for example, via a damped mechanism with a smooth spring-loaded retraction. Assume, for example, that the OMPA is performing high intensity processing where the bucket assembly is heated. In such a situation, the lid may remain locked so long as the temperature of the processing chamber (or its contents) remains above a threshold (e.g., programmed in memory). This locking action may serve as a safety mechanism by ensuring that a user cannot easily access the interior of the OMPA under unsafe conditions. Note, however, that the user may still be able to override this locking action (e.g., by interacting with an input mechanism accessible along the exterior of the OMPA).

[0176] Air may be "sucked" downward into the air treatment system whenever the lid is opened, thereby preventing odors from escaping into the ambient environment. This action may be particularly helpful in preventing odors from escaping the OMPA when the lid is opened mid-cycle (i.e., while the OMPA input is being dried or ground). This action can be initiated by a controller based on one or more outputs produced by a sensor that is located proximate to where the lid contacts the durable housing when in the closed position. For example, a sensor could be located along the periphery of the lid, and its output may be indicative of whether the lid is adjacent to the durable housing (i.e., in the closed position). As another example, a sensor could be located along the periphery of the durable housing, and its output may be indicative of whether the lid is adjacent to the durable housing (i.e., in the closed position).

Overview of Operating States

[0177] Over time, the OMPA may cycle between various states to process OMPA input. As mentioned above, the OMPA may be able to convert OMPA input into a relatively stable product (e.g., food grounds) by drying and grinding the OMPA input. The control parameters for drying or grinding the OMPA input may be dynamically computed (e.g., by the controller **110** of FIG. **1**) as a function of the outputs produced by sensors tasked with monitoring characteristics of the air traveling through the OMPA, as well as the mass or weight of the OMPA input in the processing chamber. For example, the control parameters could be dynamically computed as a function of (i) humidity of the air traveling through the OMPA, (ii) temperature of the air traveling through the OMPA, and (iii) weight of OMPA input contained in the OMPA. FIG. **10** includes an example of an operating diagram that illustrates how control parameters can be dynamically computed in accordance with an intelligent time recipe in order to process the contents of an OMPA.

[0178] As mentioned above, the OMPA may be able to intelligently cycle between different states to process OMPA input. Six different states are described in Table I. Those skilled in the art will recognize, however, that embodiments of the OMPA may be able to cycle between any number of these states. For example, some OMPAs may only be able to cycle between two, three, or four of these states, while other OMPAs may be able to cycle between all six states.

[0179] The OMPA may rely on a single target criterion or multiple target criteria to determine when to cycle between these states. The target criteria could be programmed into the memory of the OMPA, or the target criteria could be specified by a user (e.g., through an interface generated by a control platform). Examples of target criteria include moisture level, temperature, and weight. Using moisture level as an example, there may be multiple preset moisture levels (e.g., 10, 20, 30, and 40 percent) from which the target criterion could be selected (e.g., based on the nature of the OMPA input). The OMPA may not measure moisture of the OMPA input but can instead predict or infer the moisture based on, for example, the humidity of air traveling through the OMPA and the weight of OMPA input. The OMPA could also rely on the average times for completion of these states. Assume, for example, that the OMPA receives input indicative of a request to process OMPA input deposited into the processing chamber. In such a situation, the OMPA may determine when to schedule the various states based on (i) how long those states have historically taken to complete and (ii) the weight of the OMPA input, among other factors. For example, the OMPA may attempt to schedule high intensity processing to be completed overnight as the grinding mechanisms may operate at a noise that might disturb nearby individuals.

TABLE I

Descriptions of states for processing OMPA input.

State Identifier (ID)	State Description
High Intensity Processing (HIP)	Goal: Achieve the target moisture level at a given temperature. Details: Temperature, airflow, and/or grinding mechanisms can be set to high settings. HIP normally takes at least several hours to complete, so the OMPA may attempt to schedule overnight. HIP may be triggered manually (e.g., via an interaction with an input mechanism, or via an instruction provided through the control platform) or automatically (e.g., based on a determination that the weight of the OMPA input exceeds a threshold).
Sanitize	Goal: Kill at least a predetermined number (e.g., greater than 99 percent) of pathogens. Details: Settings are similar to HIP, though the temperature is higher. By default, sanitization may be performed before, during, or after HIP. Thus, sanitization may be considered part of HIP in some instances.
Low Intensity Processing (LIP)	Goal: Advance drying in a non-intrusive manner while individuals are more likely to be nearby (e.g., during daylight hours). Details: Temperature, airflow, and/or grinding mechanisms can be set to low settings. While LIP may be similar to HIP in operation, LIP may be more suitable if individuals may be nearby. For example, the noise generated by the grinding mechanisms will typically be more tolerable at low settings than at high settings.
Burst Grind	Goal: Incorporate wet (e.g., unprocessed) OMPA input into dry (e.g., processed or semi-processed) OMPA input to make drying easier. Details: Temperature and airflow may be maintained at the same settings as the prior state (e.g., HIP or LIP), but the grinding mechanisms can be set to a higher state to grind the wet OMPA input that has been newly added. Burst grind may be performed when new OMPA input is added to the processing chamber while HIP or LIP is being performed.
Standby	Goal: Conserve power once the target criteria have been reached. Details: Temperatures, airflow, and/or grinding mechanisms can be off, unless necessary to meet some other criterion. For example, airflow and/or grinding mechanisms may be occasionally triggered to maintain an odor criterion.
Cooldown	Goal: Allow the user to handle the processing chamber. Details: Settings are similar to standby, though airflow may be higher if necessary to cool the processing chamber or the product stored therein.

[0180] As mentioned above, the durations of these states can be dynamically determined based on, for example, analysis of outputs generated by sensors housed in the OMPA. However, the durations of these states are pre-defined—at least initially—in some embodiments. For example, high intensity processing may be programmed to occur for a certain amount of time (e.g., 4, 6, or 8 hours), and burst grind may be programmed to occur for a certain amount of time (e.g., 30 seconds, 5 minutes, 30 minutes) whenever new OMPA input is added. Those skilled in the art will also recognize that the duration of some states could be dynamically determined, while the duration of other states could be predefined. As an example, the OMPA may continue performing high intensity processing until the target criteria are achieved. However, whenever new OMPA input is added, the OMPA may cycle to burst grind for a certain amount of time (e.g., 30 seconds, 5 minutes, 30 minutes) before reverting back to its previous state.

[0181] The above-described description of various OMPA states is merely illustrative and that those skilled in the art will appreciate that any number of OMPA states may be used and the criteria for transitioning from one state to another may vary. Examples of other OMPA processing algorithms and control methodologies can be found, for example, in commonly owned U.S. Patent Application Publication Numbers US20230081670 and US20230083105, the disclosures of which are incorporated by reference in their entireties.

[0182] The motor can be controlled to rotate in a first direction for a first period of time and to rotate in a second direction for a second period of time. The motor can alternate between the first direction and the second direction after the first period of time has elapsed or after the second period of time has elapsed. The motor may alternate rotation direction to ensure that the organic matter is sufficiently mixed and ground. The orientation of the cutting members can cause the organic matter to oscillate from side to side in a first pattern (e.g., a FIG. **8** shape following a first path) when rotated in a first direction and to oscillate from side to side in a second pattern (e.g., a similar FIG. **8** shape following a second path) when rotated in a second direction.

[0183] As yet another example, a load on the motor is monitored for an overload condition. In one approach, a torque sensor can be used to sense the load on the motor. In another approach, a current sensor can be used to sense the current consumption by the motor. If the current consumption exceeds a threshold, this can trigger an overload condition. In yet another approach, a speed sensor can be used to monitor the motor speed. If the speed drops below a certain rate for a fixed period of time, this can trigger the overload condition. Any combination of these approaches may be used to detect overload conditions. If the overload condition is monitored, an overload protection scheme can be engaged to protect the bucket assembly. The overload protection scheme can include stopping the motor to cease rotation in a current direction, reversing rotation of the motor to enable one of the cutter forks or one of the paddles responsible for causing the overload condition to backout a fixed number of angular degrees of rotation, and reversing rotation of the motor to resume rotation in the current direction. In another approach, the overload protection scheme can include stopping the motor to cease rotation and reversing rotation of the motor to cause the cutting members to rotate in the opposition direction. In yet another approach, the overload protection scheme can include determining that engagement of the overload protection scheme is not able to rectify the overload condition and notifying a user of the bucket assembly of the overload condition. If desired, any combination of these different overload protection schemes may be implemented.

[0184] As another example, the impellers can rotate asymmetrically with respect to each other at a speed ranging between 1 RPM and 2 RPMS. Despite being rotated at a constant speed, warbling noise is substantially eliminated through impeller design and specifically selected spacing of the impellers relative to the inside surfaces of the metal bucket.

[0185] FIG. **10** shows an illustrative process **1000** for processing organic matter with a bucket assembly, according to an embodiment. The bucket assembly can be, for example, bucket assembly **600** that is inserted into liner structure **310**. When bucket assembly **600** is inserted into liner structure **310**, the impeller couplers are interfaced with the drivetrain couplers, at step **1010**. Each impeller coupler is associated with a respective impeller assembly that rotates about a respective vertical axis. Each drivetrain coupler is associated with a respective drive shaft that is coupled to a gearbox that is powered by a motor. The bucket assembly further includes a first blade array secured to a first curved surface of a metal housing in a vertical orientation and a second blade array secured to a second curved surface of the metal housing in a vertical orientation. At step **1020**, after the OMPA confirms that bucket assembly is present within the liner structure and the OMPA is ready to commence an OMPA processing action, the motor is instructed to rotate in a first direction, which causes the gearbox to actuate and rotate drive shafts and associated drivetrain couplers. The gearbox may be configured to asynchronously rotate the drive shafts such that each drive shaft is rotated at a different speed. At step **1030**, the first and second impeller assemblies are rotated in a first rotation direction in response to rotation of the drive shafts. The first impeller assembly rotates about a first vertical axis within the metal housing of the bucket assembly and includes at least a first cutting member and a first integrated cutting and paddle member. The first blade array interfaces with the first cutting member and the first integrated cutting and paddle member during each rotation of the first impeller assembly. The second impeller assembly rotates about a second vertical axis within the metal housing and includes at least a second cutting member and a second integrated cutting and paddle member. The second blade array interfaces with the second cutting member and the second integrated cutting and paddle member during each rotation of the second impeller assembly. At step **1040**, a hot plate that interfaces with a hot plate interfacing surface of the metal housing can be heated to impart heat into the metal housing. At step **1050**, a first fan draws in ambient air from outside of the OMPA and that air is optionally heated and directed into the bucket assembly. At step **1060**, untreated air is pulled out of the bucket assembly by a second fan and the untreated air is routed through an air treatment system that converts the untreated air to treated air and expels the treated air outside of the OMPA. At step **1060**, the OMPA can execute an OMPA processing algorithm that modifies operation of the motor, heat plate, first fan, and second fan depending on a plurality of factors (e.g., run time, mass, sensor input of temperature(s) and humidity) to convert contents contained in the bucket assembly to OMPA output.

[0186] It should be understood that the steps shown in FIG. **10** are illustrative and the order of the steps may be changed, additional steps may be added, or steps may be omitted.

[0187] FIG. **11** shows an illustrative process **1100** for processing organic matter with a bucket assembly, according to an embodiment. The bucket assembly can include first and second impeller assemblies and first and second blade arrays, a hot plate, a drivetrain assembly that is coupled to the first and second impeller assemblies when the bucket array is inserted in the OMPA. At step **1110**, process **1100** is operative to rotate the first and second impeller assemblies about respective vertical axes using a drivetrain assembly, wherein the first impeller assembly includes first cutting member and first integrated paddle and cutting member, wherein the second impeller assembly includes a second cutting member and a second integrated paddle and cutting member. At step **1120**, process **1100** is operative to cut the organic matter when the first cutting member and first integrated paddle and cutting member pass by the first blade array and when the second cutting member and second integrated paddle and cutting member pass by the second blade array. At step **1130**, process **1100** is operative to redirect a flow of the organic matter downwards towards a bottom surface of the bucket assembly with the first and second integrated paddle and cutting members. At step **1140**, process **1100** can heat the organic matter by applying heat to the bucket assembly using the hot plate, wherein a combination of the cutting, the redirecting, and the heating converts the organic matter to a ground and selectively desiccated product.

[0188] It should be understood that the steps shown in FIG. **11** are illustrative and the order of the steps may be changed, additional steps may be added, or steps may be omitted.

[0189] FIG. **12** shows an illustrative process **1200** for processing organic matter with a bucket assembly, according to an embodiment. At step **1210**, process **1200** can asynchronously rotate first and second impeller assemblies in response to operation of a drivetrain assembly, wherein the first and second impeller assemblies rotate about respective vertical axes within an ellipsoid shaped metal housing comprising a first vertically oriented blade array secured to an inner surface of the metal housing within a first radial sweep zone of the first impeller assembly and a second vertically oriented blade array secured to the inner surface within a second radial sweep zone of the second impeller assembly, wherein the first impeller assembly comprises first and second cutting members and a first paddle and cutting member, wherein the second impeller assembly comprises a third cutting member and a second paddle and cutting member, and wherein during rotation of the first impeller assembly, the first and second cutting members and the first paddle and cutting member interact with respective blades of the first blade array, and during rotation of the second impeller assembly, the third cutting member and the second paddle and cutting member interact with respective blades of the second blade array. At step **1220**, process **1200** is operative to heat the metal housing with a hot plate that interfaces with a hot plate facing surface of the metal housing.

[0190] It should be understood that the steps shown in FIG. **12** are illustrative and the order of the steps may be changed, additional steps may be added, or steps may be omitted. For example, a motor associated with the drivetrain assembly can be operated at a first speed during a first phase of a processing cycle and when the first phase is determined to be complete, the motor can be operated at a second speed, wherein the second speed is faster than the first speed. As another example, the motor can be controlled to rotate in a first direction for a first period of time, controlled to rotate in a second direction for a second period of time, and alternate between the first direction and the second direction after the first period of time has elapsed or after the second period of time has elapsed. As yet another example, a load on the motor can monitored for an overload condition and engage an overload protection scheme when the overload condition is monitored. In one embodiment, the overload protection scheme can include stopping the motor to cease rotation in a current direction, reversing rotation of the motor to move in a direction opposite of the current direction to cause the first and second impeller assemblies to reverse rotate a fixed number of angular degrees of rotation, and resuming rotation of the motor in the current direction. In another embodiment, the overload protection scheme can include stopping the motor to cease rotation, and reversing rotation of the motor to cause the plurality of cutter forks and the plurality of paddles to rotate in the opposition direction. In yet another embodiment, the overload protection scheme can include determining that engagement of the overload protection scheme is not able to rectify the overload condition and notifying a user of the bucket assembly of the overload condition.

Overview of Control Platform

[0191] In some situations, it may be desirable to remotely interface with an OMPA. For example, a user may want to initiate high intensity processing if she is not at home and does not expect to return home for an extended duration (e.g., several hours). This could be done through a control platform that is communicatively connected to the OMPA. Thus, the user may be able to interact with the OMPA through the control platform. Through the control platform, the user may also be able to view information regarding the OMPA (e.g., its current state, average duration of each state, how much OMPA input has been processed over a given interval of time, current weight of the bucket and its contents) through interfaces that are generated by the control platform.

[0192] As discussed above in connection with FIGS. **5A-5E**, load cell **544** supports a combination of mass components including bucket assembly **600**, overmold structure **510**, heat plate **502**, insulation layer **504**, and drivetrain assembly **550**. Load cell **544** can measure the mass of this combination, including contents (e.g., OMPA input and prior existing FOOD GROUNDS) contained in bucket assembly **600**. Load cell **544** is designed and used as a strain gauge to measure mass. Load cell **544** may benefit from relatively enhanced resolution in mass measurements because the load cell only has to account for the weight of the combination and organic contents, as opposed to one or more load cells that have to account for the entire weight of the OMPA. However, the ability to obtain precise and high resolution mass measurements can require that noise sources be isolated or eliminated. For example, air being injected into the bucket assembly may introduce noise that affects the accuracy of load cell mass measurements. Many noise sources (e.g., air induced noise, temperature drift) can be handled in firmware. Other noise sources can be eliminated or mitigated using mechanical interface embodiments discussed herein. These mechanical interfaces are now discussed. FIGS. **15A** and **15B** show different views of load cell **544** according to an embodiment. Load cell **544** can include mass bracket interfacing surface **1510**, hard stop interfacing surface **1520**, and drivetrain assembly interfacing surface **1530**. Interfacing surfaces **1510** and **1530** are on opposite sides and on opposing faces of load cell **544**. For example, surface **1510** may point downwards to the bottom of the OMPA, whereas surface **1530** may point upwards to the top of the OMPA. Mass bracket interfacing surface **1510** and hard stop interfacing surface exist on the side of load cell **544**, but on opposite ends, as shown.

[0193] Surface **1510** may include registration posts **1511** and **1512** that protrude from the planar surface defining interfacing surface **1510**. Registration posts **1511** and **1512** may slot into respective registration cavities existing in the mass bracket (e.g., mass bracket **414**). In some embodiments, registration posts **1511** and **1512** can be press fit into respective registration cavities. Retention holes **1514** and

1515 may exist within in the portion of load cell **544** proximate to interfacing surface **1510**. Retention holes **1514** and **1515** may be configured to receive screws, fasteners, or some other retention mechanism secure surface **1510** to the mass bracket. In some embodiments, the screws can be self-tapping screws that lock into place without assistance of an adhesive (e.g., such as Loctite™). In another embodiment, the screws can be trilobular screws that self-tap.

[0194] In some embodiments, surface **1510** can include a shim or include an integrated shim designed to counteract any angular rotation that could be caused by the combination of mass components. As shown in FIG. **5**B, for example, load cell **544** is offset with respect to a center axis of the OMPA. This offset position can result in the combination of mass components tending to rotate into load cell **544**. Such a rotation is undesired because the rotation may cause the bucket assembly to rotate about its center axis and potentially into the liner structure. The shim may offset load cell **544** by a fixed angle—an anti-rotation angle—to counteract a rotational load caused by the combination of mass components and the offset location of load cell **544**. For example, the shim may be a wedge having a fixed angle. In some embodiments, this wedge can be integrally formed as part of the metal composition (e.g., aluminum) of load cell **544**.

[0195] Surface **1530** may be associated with registration cavities **1531** and **1532** that are designed to receive respective posts extending from the drivetrain assembly (e.g., assembly **550**). The respective posts may be press fit into registration cavities **1531** and **1532** to securely mount drivetrain assembly **550** to load cell **544**. Surface **1530** may also be associated with retention holes **1534** and **1535** that are configured to receive screws, fasteners, or some other retention mechanism. For example, self-tapping screws (e.g., such as trilobular self-tapping screws) may be used to further secure surface **1530** to the drivetrain assembly, in addition to the press fit of the posts into cavities **1531** and **1532**. The combination of the press fit with cavities **1531** and **1532** and the fasteners helps to ensure that drivetrain assembly **550** is aligned as perfectly as possible with load cell **544** by minimizing any unnecessary angular shift therebetween. In addition, this union between load cell **544** and drivetrain assembly **550** is the first in a series of precisely aligned components that stack up as part of the combination of components whose mass is measured by load cell **544**. As discussed above, the stack up further includes alignment of insulation layer **504** to drivetrain assembly **550**, the alignment of hot plate **502** to insulation layer **504** and to drivetrain assembly **550**, the alignment of overmold structure **510** to liner structure **310**, hot plate **502**, and insulation layer **504**. These components are designed to precisely interface with each other to ensure a desired stack up that is ultimately supported by load cell **544**.

[0196] Surfaces **1510**, **1520**, and **1530** represent interface points in which load cell **544** interfaces with the mass bracket and the drivetrain assembly. Member **1550** may exist between surfaces **1510** and **1520**, as shown. Member **1550** may serve as the cantilever arm stemming from mass bracket interfacing portion **1510** and terminating with portions **1520** and **1530**. Member **1550** may be stepped down in dimensions relative to portions **1510**, **1520**, and **1530**. As shown in FIG. **15**A, the step change transition from portion **1510** to member **1550** is greater than the step change transition from portion **1520** to member **1550**. This difference in step changes ensures that portions **1520** and **1530** are cantilevered with respect to portion **1510**. That is, when a downward force is applied by the combination of components onto portion **1530**, load cell **544** can bend downwards at the distal portion (e.g., portions **1520** and **1530**). This force is measured by load cell **544**.

[0197] Load cell **544** may be calibrated at a particular temperature and firmware can incorporate temperature compensation to adjust for changes in temperature conditions existing in the OMPA. For example, when the hot plate is active and the metal housing is being heated up, the temperature inside the OMPA, including the environment surrounding load cell may exhibit increased temperatures. The changes in ambient temperature, which affect the temperature of load cell **544**, can be compensated for to ensure that load cell **544** provides accurate mass measurements.

[0198] FIGS. **16**A and **16**B show illustrative bottom and top perspective views, respectively, of mass bracket **414** according to embodiment. Mass bracket **414** may be constructed from a metal or plastic material. Mass bracket **414** includes, among other features, load cell interface **1610**. Load cell interface **1610** can provide a mounting surface for load cell **544** to be secured to mass bracket **414**. As shown, load cell interface **1610** may be raised or offset from surface **1601**, which points towards the top of the OMPA and extends for at least the length of load cell **544** (such that portion **1520** can interface with it if required). Load cell interface **1610** may be offset, for example, to accommodate clearance tolerances with the OMPA. In other words, but for the offset of interface **1610**, there may not be sufficient space for the fasteners, for example. Surface **1602**, by contrast, points downwards to the bottom of the OMPA. As will be shown in other figures, mass bracket interface portion **1510** of load cell **544** is anchored to mass bracket interface portion **1510**. When mass bracket interface portion **1510** is secured to mass bracket **414**, the surface of portion **1510** and the surface of load cell interface **1610** can be substantially co-planar and a gap distance can exist between interface portion **1520** and load cell interface **1610** (when the combination of components and organic matter are not causing load cell **544** to bottom out). Load cell interface **1610** can include registration cavities **1611** and **1612** that receive respective registration post **1511** and **1512** of load cell **544**. Load cell interface **1610** can also include through-holes **1614** and **1615** through which screws, fasteners, or other retention mechanisms can pass through and interface with respective retention holes **1514** and **1515**. When load cell **544** is secured to load cell interface **1610**, the combination of the fasteners, registration posts **1511** and **1512**, and registration cavities **1611** and **1612** substantially reduce or eliminate any undesired angular rotation existing between load cell interface **1610** and load cell **544**.

[0199] Mass bracket **414** may function as a datum for the mass system by providing a solid platform in which the mass components are stacked up, for which liner structure **310** is attached and, for which midframe structure **412** is attached. Mass bracket **414** can include liner interface structures **1621** and **1622** for providing structures for liner structure **310** to be mounted and secured. In addition, mass bracket **414** can include frame structures **1631** and **1632** for providing structures for midframe structure **412** to be mounted and secured.

[0200] FIGS. **17**A and **17**B show perspective top and bottom views of drivetrain assembly **550**, respectively. Drivetrain assembly **550** can include, among other features, load cell interfacing portion **1730** that is designed to connect to load cell **544**. Portion **1710** can include posts **1731** and **1732** that are designed to fit inside registration cavities **1531** and **1532**, respectively of load cell **544**. Portion **1710** can include through-holes **1734** and **1735** through which screws, fasteners, or other retention mechanisms can pass through and interface with respective retention holes **1534** and **1535**. Portion **1710** can also have side walls **1741** and **1742** that can abut reciprocal side walls of load cell **544**. When load cell **544** is secured to drivetrain assembly **550** via portion **1710**, the combination of the fasteners, registration posts **1731** and **1732**, registration cavities **1531** and **1532**, and side walls **1741** and **1742** substantially reduce or eliminate any angular rotation that could potentially occur during application of a load to load cell **544**. Thus, the combination of anti-angular rotation features utilized by mass bracket interfacing portion **1610**, load cell interfacing portion **1730**, and load cell **544** jointly contribute to substantial mitigation or elimination of any angular rotation during load events.

[0201] FIG. **18**A shows a partial illustrative view mass bracket **414** coupled to load cell **544** via fasteners **1814** and **1815**, which may pass through through-holes **1614** and **1615** (not shown) and engage with retention holes **1514** and **1515** (also not shown). FIG. **18**B shows a partial illustrative view of load cell **544** coupled drivetrain assembly **550** via fasteners **1834** and **1835**, which may pass through through-holes **1734** and **1735** (not shown) and engage with retention holes **1534** and **1534** (also not shown). FIG. **18**C show an enlarged cross-sectional view of load cell **544** mounted to mass bracket **414** (only partially shown) and to drivetrain assembly **550** (which is also partially shown). FIG. **18**C also shows load cell interface **1610**, mass bracket interfacing surface **1510**, hard stop interfacing surface **1520**, drivetrain assembly interfacing surface **1530**, and member **1550**. The step changes between surface **1510** and member **1550** and between surface **1520** and member **1550** are shown. Also shown, is the gap distance between surface **1520** and load cell interface **1610**. The interface between surface **1520** and load cell interface **1610** can represent a first downward motion hard stop in which load cell **544** hard stops against mass bracket **414**. A second downward motion hard stop is shown in FIG. **18**D, which shows a partial perspective view of mass bracket **414**, drivetrain assembly **550**, and other bucket assembly components. The second downward hard stop can exist between a bottom surface **1851** of drivetrain assembly **550** (also shown in FIG. **17**B) and surface **1601** (also shown in FIG. **16**B) of mass bracket **414**. The gap distance of the second downward hard stop is greater than the gap distance of the first downward hard stop. The second downward hard stop can be a failsafe to the first downward hard stop. FIG. **18**D also shows an upwards direction hard stop that prevents the combination of components from moving too far upwards within the OMPA. Bracket **1880** is secured to mass bracket **414** and is designed to interface with surface portion **1852** (also shown in FIG. **17**A) of drivetrain assembly **550** to provide the upwards direction hard stop. In some embodiments, bracket **1880** may be a separate component that is secured to bracket **414** or it can be integrally formed as part of bracket **414**. The downward and upward hard stops can be provided to protect the OMPA from damage, for example, during shipment of the OMPA or user abuse (e.g., a user slamming the bucket assembly down into the liner structure or horseplay that results in the OMPA being toppled over).

[0202] FIG. **19** shows an illustrative cross-sectional view bucket assembly **600**, liner structure **310**, mass bracket **414**, and other components according to an embodiment. As shown, bucket assembly **600** is shown to be contained within liner structure **310** and is supported by heat plate **502**, insulation layer **504**, overmold structure **510**, drivetrain assembly **550**, and load cell **544**. Load cell **544** is also attached to mass bracket **414** and mass bracket **414** is secured to liner structure **310**. As explained above, the combination of bucket assembly **600**, heat plate **502**, insulation layer **504**, overmold structure **510**, and drivetrain assembly **550** "floats" relative to liner structure **310** and mass bracket **414** and is supported by load cell **544**. Individual components such as heat plate **502**, insulation layer **504**, overmold structure **510**, drivetrain assembly **550** are now discussed. FIG. **20** shows an exploded view showing heat plate **502**, insulation layer **504**, overmold structure **510**, drivetrain assembly **550**, drivetrain seals **506**, couplers **553** and **554**, and various fasteners or screws. Many of the components shown in FIG. **20** can be referred to as a bucket interfacing subassembly that is operative to rotate impellers of the bucket assembly and to impart heat into the metal bucket.

[0203] FIGS. **20**A and **20**B show respective bottom and top views of a drivetrain and heating system **2000**, showing heat plate **502**, insulation layer **504**, overmold structure **510**, drivetrain assembly **550**, drivetrain seals **506**, and couplers **553** and **554** in an assembled state. As shown in FIG. **20**A, insulation layer **504** abuts a surface of drivetrain assembly **550**.

[0204] FIGS. **21**A and **21**B show respective bottom and top views showing just overmold structure **510** and insulation layer **504**. Insulation layer **504** can include registration holes **2110** that serve as guide posts for heat plate post members (not shown), drivetrain through-holes **2120** in which seals **506** (not shown) can reside, and fastener through-holes **2130** through which fasteners or screws pass through layer **504** and retention tabs **2131** of overmold structure **510** to engage with hot plate **502** (not shown).

[0205] FIGS. **21**C-**21**E show perspective bottom and top views of overmold structure **510** and hot plate **502**. Hot plate **502** can reside on top of retention tabs **2131** and inner ring structure **2140**. A silicon gasket may be overmolded to inner ring structure **2140**. This gasket can interface with hot plate **502** to form an airtight seal. Overmold structure **510** can include outer ring structure **2142**, which may be overmolded with a silicon gasket. Liner structure **310** is designed to fit on top of the gasket that is molded over outer ring structure **2142**. This gasket can interface with liner structure **310** to form another airtight seal. Inner ring structure **2140** sits at a lower plane than outer ring structure **2142**. In addition, the width and length of inner ring structure **2140** is smaller than the width and length of outer ring structure **2142**. The size and plane differentials of ring structures **2140** and **2142** provide space for catch channel **2150** to exist between inner ring structure **2140** and outer ring structure **2142**. Catch channel **2150** can serve as a debris catcher (e.g., a crumb catcher) for any matter that is not properly placed into the bucket assembly. When the bucket assembly is removed from the OMPA, a user can clean out catch channel **2150** as needed. When the bucket assembly is inserted into the OMPA, the bottom of the metal housing rests on hot plate **502** and the feet members **680** can be suspended over catch channel **2150**.

[0206] Heat plate **502** can include thermistors **2132** to monitor temperature of the heat plate, thermostat **2133** for controlling a temperature of heat plate **502**, and terminals **2334** for receiving power. Heat plate **502** also includes drivetrain through-holes **2135** that include drivetrain seal retaining feature **2135***a* and bucket assembly engagement feature **2135***b*. Drivetrain seal retaining feature **2135***a* is configured to receive an impeller seal, which provides an airtight seal between the drivetrain coupler and hot plate **502**. Bucket assembly engagement feature **2135***b* may be chamfered to promote insertion of the impeller coupler into heat plate **502** and into a drivetrain coupler.

[0207] FIGS. **21**C-**21**E show post structures **2115** more clearly and FIG. **22** shows how post structures **2115** interface with registration holes **2110** of insulation layer **504**.

[0208] FIG. **23** shows an illustrative process **2300** for measuring mass according to an embodiment. Process **2300** may be implemented in an organic matter processing apparatus including a liner structure having a first aperture through which a bucket assembly is inserted and removed and a second aperture, a mass bracket secured to the liner structure, a load cell secured to the mass bracket, and a drivetrain and heating system secured to and supported by the load cell, wherein the drivetrain and heating system float relative to the liner structure and the mass bracket. At step **2310**, presence of the bucket assembly in the liner structure can be detected (e.g., using a sensor or the load cell). At step **2320**, process **2300** can measure, using the load cell, mass of the drivetrain and heating system, the bucket assembly, and any contents contained in the bucket assembly.

[0209] It should be understood that the steps shown in FIG. **23** are illustrative and the order of the steps may be changed, additional steps may be added, or steps may be omitted. For example, bucket present detection can be detected using the mass sensor. In another approach, the bucket present detection can be detected by monitoring current in the motor driving the drivetrain. In this approach, the load current incurred by the motor is higher when the bucket is present than when the bucket is not present. Thus, to determine whether the bucket is present, the system can run the motor at a relatively low duty cycle and monitor the load current. If the load current is at or above a bucket present threshold, then it can be inferred that the bucket is present. In yet another approach, air pressure or airflow within the OMPA can be measured to determine whether the bucket is present. The air treatment system in the OMPA is designed to be substantially airtight to prevent odorous gases from leaking out of the OMPA before being treated by the air treatment chamber. The presence of the bucket assembly may be required to complete the airtight seal of the air treatment system (assuming all other components are securely in place and the exhaust port filter is not clogged). When the fan in the air treatment system is running, a pressure drop can be monitored. If the bucket is present, then the monitored pressure drop should meet or exceed a nominal threshold—indicating that the bucket is present. However, if the pressure drop is below the threshold, then it may be inferred that the bucket is not present, or the air treatment chamber is not present or seated properly. If the pressure drop exceeds a max threshold, which is greater than the nominal threshold, then it may be inferred that that one or more ports (e.g., holes **308** or port **312**) are clogged or blocked. Depending on the bucket present status (or indication of erroneous pressure readings), the OMPA can take the appropriate actions (e.g., prevent operation of OMPA processing or provide a notice to the user).

[0210] As discussed above, when pedal **290** is depressed, a mechanical linkage causes lid **204** to open. Bezel **305** may remain in place as lid **204** opens. If desired, a user can manually lift bezel **305**, for example, to remove the bucket. The mechanical linkage is now discussed in reference to FIGS. **4**G-**4**I and FIGS. **24**A-**24**C through FIGS. **28**A-**28**B. The mechanical linkage can include a pedal assembly, linkage rods, and a hinge assembly. The linkage rods connect the pedal assembly to the hinge assembly and can travel in vertical up and down directions in response to pedal depression and pedal release events. For example, when pedal **290** is depressed, linkage rods **450** may travel in an upwards direction to cause the hinge assembly to open lid **204**. When pedal **290** is released, linkage rods **450** may travel downwards to cause the hinge assembly to close lid **204**. Referring back to FIGS. **4**G-**4**I, FIG. **4**G shows an illustrative back view and FIGS. **4**H and **4**I show illustrative side views of OPMA **200** with exterior body panels removed. Linkage rods **450** are shown being routed between housing base **410** to the pedal assembly contained therein (not shown) and to the hinge assembly located near the top of OMPA **200**. Two linkage rods **450** may exist to evenly distribute forces being imparted on the hinge assembly when the pedal is depressed. In addition, linkage rods **450** may have a non-linear construction to accommodate space requirements and configuration of other assemblies that collectively make up the OMPA. Linkage rods **450** may be constructed from metal, plastic, or combination thereof. For example, linkage rods can have pedal portion **450***a*, transition portion **450***b*, and hinge portion **450***c*. As shown in FIG. **4**G, pedal portion **450***a* of linkage rods **450** are spaced apart at a first distance when the rods are adjacent to housing base **410**, midframe structure **412**, and mass bracket structure **414**. Petal portion **450***a* may pass through respective through-holes of midframe structure **412**. Linkage rods **450** can undergo a transition from the first space apart distance to a spaced apart second distance when the rods are adjacent to liner structure **310**—this is illustrated by transition portion **450***b*. The second distance may be maintained from the transition point between portions **450***b* and **450***c* to the hinge assembly. In addition, transition portion **450***b* can be out of plane with respect to pedal portion **450***a*. This is shown more clearly in FIGS. **4**H and **4**I by showing that transition portion **450***b* transitions from a first plane that is coplanar with pedal portion **450***a* to a second plane that is parallel to but offset with respect to the first plane. The first plane is closer to a center vertical axis whereas the second plane is farther away from the center vertical axis. Hinge portion **450***c* may be oblique to the first plane and can be designed to point towards the center vertical axis at the transition junction of the transition portion **4450***b* and hinge portion **450***c*. This oblique angle may better enable hinge portion **450***c* to interface with a hinge pusher (shown in FIGS. **26**A-**26**E).

[0211] The pedal assembly is now discussed in detail with reference to FIGS. **24**A-**24**C. FIG. **24**A shows an illustrative cross-sectional view of housing base **410** with pedal assembly **2410** integrated therein. FIG. **24**B shows a perspective view of pedal assembly **2410** with housing base **410** removed. FIG. **24**C shows an illustrative side view of pedal assembly **2410** with housing base **410** removed. Pedal assembly **2410** can include plate member **2420** that rotates about pedal hinge axis **2422** when plate member **2420** cycles between depressed and released states. Plate member **2420** can include pedal portion **2424**, axis portion **2425**, and linkage interface portion **2426**. Pivot members **2430** (only one of which is shown in FIG. **24**B) are positioned co-axially with the pedal hinge axis **2422** and a respective support block **2432**. Support blocks **2432** are supported by housing base **410** and serve as anchors to pivot members **2430**, which when coupled to plate **2420**, enable plate to rotate about pedal hinge axis within housing base **410**. Through use of support blocks **2432** and pivot member **2430**, plate member **2420** is suspended in air within housing base **410** when in a released or inactive state. As shown in FIGS. **24**B and **24**C, pedal assembly **2410** is suspended above support plate **292** when in the released or inactive state. When pedal assembly **2410** is in a depressed state, pedal portion **2424** may interface with support plate **292**. In addition, when in the depressed state, pedal assembly **2410** rotates about pedal hinge axis **2422**, causing linkage interface portion **2426** to rotate upwards, which causes linkage rods **450** to travel vertically upwards. As shown in FIGS. **24**B and **24**C, linkage rods **450** are secured to linkage interface portion **2426**.

[0212] A dampener **2440** can be mounted to pedal portion **2424**. For example, dampener **2440** can be a fluidic dampener. Dampener **2440** is constructed to interface with a portion **411** of housing base **410** when pedal assembly **2410** is in an undepressed or relaxed state. Dampener **2440** is operative to dampen the closing action of lid **204** when pedal assembly transitions from a depressed state to an undepressed state. Springs located in the hinge assembly may bias linkage rods **450** to travel in downwards vertical direction, thereby returning pedal assembly **2410** to an undepressed or relaxed state.

[0213] Plate member **2420** can constructed from a single piece of plastic or metal or can be constructed from two or more components. For example, pedal portion **2424** can be constructed from metal, whereas axis portion **2425** and linkage interface portion **2426** can be constructed as a single piece of plastic.

[0214] FIGS. **25**A-**25**E show different views of hinge assembly **2500** and components thereof. FIG. **25**A shows hinge assembly **2500** and how it is secured to liner structure **310** and to lid **204**. In particular, hinge bracket **442** is coupled to liner structure **310** and hinge plate **440** is coupled to lid **204** (or more particularly to lid plate **204*a*** shown in FIG. **25**B). Hinge plate **440** is rotatably coupled to hinge bracket **442** via dowels **2540** (shown in FIG. **25**B) that allows hinge plate **440** to rotate about a hinge plate axis **2541**. Linkage rods **450** are attached to a hinge pusher **2550**, which rotates about hinge pusher axis **2551**, and to pedal assembly **2410** (of FIG. **24**A-**24**C). Hinge plate axis **2541** and hinge pusher axis **2551** may be vertically aligned in the same plane, where hinge plate axis **2541** is positioned above hinge pusher axis **2551**. Hinge pusher **2550** is movably coupled to hinge bracket **442** via pins or dowls and is spring loaded with springs **2552** that bias hinge pusher **2250** to rest against a bottom surface of lid plate **204*a*** or to hinge plate **400**. Springs **2552** may also assist in opening lid **204** during a pedal depression event. When linkage rods **450** travel vertically upwards, in response to a user depressing pedal portion **2224**, linkage rods cause hinge pusher **2550** rotate upwards, thereby causing hinge plate **440** to also rotate upwards to open lid **204**. A dampener **2260** (e.g., a rubber dampener), which is attached to hinge plate **440**, may dampen a final travel portion of lid **204** so that it gently comes to a stop when being opened. Dampener **2260** may engage a portion of hinge pusher **2550** during the upward rotation of hinge plate **440**, to cause the dampening action. When pedal portion **2224** is no longer depressed, the weight of lid **204** and hinge plate **440** may cause hinge pusher **2550** and lid plate **440** to rotate downwards to close lid **204**.

[0215] Hinge assembly **2500** decouples linkage rods **450** from hinge plate **440** and lid **204** by directly coupling linkage rods to hinge pusher **2550**. This decoupling can enable a user to manually open lid **204** independently of the linkage rod **450** movement and/or pedal depression. In addition, the decoupling can mitigate damage to the linkage system if a user uses the lid or pedal incorrectly.

[0216] Referring now specifically to FIG. **25**B, portions of lid **204** are removed and hinge bracket **442** is removed. FIG. **25**B shows that hinge plate **440** has a relatively large flat planar section **440*a*** that is parallel to lid plate **204*a*** and a relatively smaller member **440*b*** that extends perpendicularly with respect to section **440*a***. Planar section **440*a*** can be secured to a top surface of lid plate **204*a***. This way, when hinge pusher **2550** pushes on lid **204*a*** or hinge plate **440**, lid **204** is opened. Member **440*b*** may serve as a mounting point for dampener **2260** (not shown). FIG. **25**B also shows how linkage rod **450** is connected to hinge pusher **2550**.

[0217] FIG. **25**C shows a perspective view of hinge assembly **2500**, lid **204**, bezel **305**, and part of a latch assembly. Also shown are hinge bracket **442**, linkage rods **450**, hinge pusher **2550**, axis **2441**, and axis **2551**. Hinge pusher **2550** is adjacent to bezel **305** but does not interface with it.

[0218] FIG. **25**D shows another perspective view of hinge assembly **2500** and bezel **305**. Also shown are hinge bracket **442**, linkage rods **450**, hinge pusher **2550**, and dampener **2560**. As shown, dampener **2560** is secured to member **440*b*** of hinge plate **440**.

[0219] FIG. **25**E shows yet another perspective view of hinge assembly **2500** and lid plate **204*a***. Hinge bracket **442** and hinge pusher **2550** are shown as transparent elements.

[0220] FIG. **25**E shows yet another perspective view of hinge assembly **2500** with hinge bracket **442** shown as being transparent.

[0221] FIGS. **25**G and **25**H show enlarged views of hinge bracket **442** and hinge plate **440** with emphasis on structures that enable the lid to be locked back in open position. In particular, hinge bracket **442** has nubs **2580** that are designed to interface with detents **2590** that are included with hinge plate **440**. Nubs **2580** may be constructed from the same material as hinge bracket **442** (e.g., plastic or metal). In one embodiment, hinge bracket may be constructed from PC-ABS. Detents **2590** may be constructed from the same material as hinge plate **440** (e.g., a glass filled nylon, plastic, or metal). Detents **2590** move relative to nubs **2580** when hinge plate **440** is rotated among open, open and locked back, and closed positions. When plate **440** is rotated back to the open and locked back position, as shown, detents **2590** rest on top of nubs **2580**. When plate **440** is not in the open and locked back position, detents **2590** do not rest on top of nubs **2580**. Detents **2590** may touch nubs **2580** when the lid is open, and do not touch each other when the lid is closed.

[0222] FIGS. **26**A-**26**E show different views of hinge pusher **2550** according to an embodiment. Hinge pusher axis **2551** is clearly shown in FIGS. **26**A-**26**C. Hinge pusher **2550** can include pusher portion **2610** characterized as has having a partial hollow tubular structure that extends from and between spring retaining members **2620**. Pusher portion **2610** can have interface lip **2612** that directly interfaces with a lid plate or hinge plate while at rest and when engaged in opening the lid. Spring retaining members **2620** can include cavity **2622** for holding a spring, a spring leg retaining region **2624** for holding a leg of the spring, and a hole **2666** for securing a linkage rod. A pin or dowel (not shown) can contain the spring in place with respect to spring retaining member **2620** and couple hinge pusher to hinge bracket **442** (not shown).

[0223] FIGS. **27**A-**26**C show different views of hinge bracket **442** according to an embodiment. Hinge plate axis **2541** and hinge pusher axis **2551** are shown. Member **440***b* (not shown) is constructed to fit inside gap **2710** and rotate upwards towards crossbar **2712** when the lid is opening. Holes **2720** may provide clearance for fasteners or screws being used to connect dampener **2560** (not shown) to member **440***b*. Detent **2580** is shown in FIG. **27**B.

[0224] FIGS. **28**A-**28**B show different views of hinge plate **440** according to an embodiment. Planar section **440***a*, member **440***b*, and hinge plate axis **2541** are shown. Member **440***b* can include dampener interface surface **2810** for interfacing with dampener **2560**, holes **2812**, support ribs **2814**, support structures **2816**. Holes **2812** can coincide with holes **2720** to allow fasteners or screws to secure dampener **2560** to surface **2810**. Support ribs **2814** and support structures **2816** may enhance rigidity of hinge plate **440** to repeatedly open and close lid for the lifetime of the OMPA. Detents **2590** (shown in FIGS. **25**F and **25**G) may be incorporated into support structures **2816** (shown clearly in FIG. **28**A).

Air Treatment System

[0225] FIGS. **29**A-**29**E shows an illustrative view of the air intake system, or components thereof, according to an embodiment. FIG. **29**A, in particular, has removed air intake manifold **431** to better illustrate positions of fan **432**, heater **2910**, sensor assembly **2920**, which includes board **2921**, gasket **2922**, and sensor **2923** with respect to liner structure **310**. FIG. **29**A also shows that interface portions **309***a* and **309***b* each have a relatively thin wall member that extends substantially perpendicularly away from liner structure **310**. As shown, fan **432** is positioned near a bottom portion of liner structure **310** and directly interfacing with interface portion **310***b*. Heater **2910** is positioned downstream from fan **432** within interface portion **310***a*. Sensor assembly **2920** is positioned adjacent to openings **308** and can be secured to air intake manifold **431**. Openings **308** may be sized to balance air flow into the bucket assembly and to prevent organic matter particles from entering the air intake system. For example, in one embodiment, openings may have diameter of about 2 mm.

[0226] FIGS. **29**B-**29**E show different views of air intake manifold **431**. Manifold **431** may have a dual walled construction that provides channel **2930** to receive and engage with the relatively thin walled portion of interfacing portion **310***a*. The engagement between channel **2930** and interfacing portion **310***a* may form a substantially airtight seal that does not require a gasket or other air sealing mechanism. Manifold **431** may include mounting feet **2931** for securing manifold to liner structure **310**. Manifold **431** may include heater retaining region **2933** for retaining a heater. The airtight seal may be maintained when the heater is secured to heater retaining region **2933**. Manifold **431** may also include sensor retaining region **2935** for retaining a sensor assembly. Sensor retaining region **2935** may include clips **2935***a* for retaining board **2921** in place and a fastener receptacle **2935***b* to receive a fastener that further secures board **2921** to manifold **431**. Manifold **431** may also include fan interface region **2937** for forming an airtight seal with the fan.

[0227] During operation of fan **432**, air is drawn in from the ambient environment, pushed through heater **2910**, and through openings **308**. After the forced air passes through openings **308**, that air is deflected downwards into the bucket assembly by bezel **305**. Bezel **305**, which is shown in more detail in FIGS. **30**A-**30**C, is constructed to enable air flow into and out of the bucket assembly while simultaneously limiting spray and splatter of OMPA input during OMPA processing. Furthermore, when the lid is open, bezel **305** is designed to funnel OMPA input into the bucket assembly and prevent any OMPA input from being errantly deposited onto or around the bucket assembly. FIG. **30**A shows an illustrative top view of bezel **305**. This view shows hinge members **3010** and user interface cutout **3020**.

[0228] FIG. **30**B shows an illustrative perspective view of bezel **305** with air redirection members **3031**-**3034**. FIG. **30**C shows a close up view of bezel **305** with air redirection members **3031**-**3034**. When the lid and bezel are closed, and the inlet fan (e.g., fan **423**) is operating, the ambient air may initially be directed to flow into bezel **305** between air redirection members **3032** and **3033** or be directed anywhere between redirection members **3031** and **3034**. Air redirection members **3031**-**3034** may be integrally formed as part of bezel **305** and are designed to redirect ambient air being pushed through holes **308** down into the bucket assembly. Absent the presence of members **3031**-**3034**, the ambient air may tend to circulate around the top of the bucket assembly (because this would be the least path of resistance) and not mix into the OMPA input contained within the bucket. Members **3031**-**3034** disturb the airflow path of the injected ambient air and causes the air to be redirected downwards into the bucket assembly. Air redirection members **3031**-**3034** may have notches **3031***a*-**3034***a* to accommodate a handle (not shown). Although only four air redirection members are shown, it should be understood that the shape and number of the air redirection members may vary. For example, FIG. **30**D shows different views of bezel **305***a* that include two redirection members **3051** and **3052**, which can include respective notches **3051***a* and **3052***a*. Furthermore, as another example, redirection members may be

[0229] FIGS. **31**A-**31**E show different views of parts of the air treatment system according to an embodiment. FIG. **31**A, in particular, shows liner structure **310** with exhaust airflow adapter **421** removed to better show interface **310***c* and port **312**. As shown, interface **310***c* has a relatively thin wall member that extends substantially perpendicularly away from liner structure **310**. This thin wall member may serve as an interface for exhaust airflow adapter **421** to attach and form an airtight seal. As shown in FIGS. **31**B and **31**C, peripheral wall **3110** may fit inside interface **310***c* and peripheral lip member **3112** may sit directly on top of interface **310***c*. A gasket **3114** may reside on lip member **3112** and be compressed between interface **310***c* and lip member **3112** when adapter **421** is securely mounted to liner structure **310** via feet members **3120**. Exhaust airflow adapter **421** can include sensor assembly retaining region

3130 for retaining a sensor assembly including a circuit board, gasket, and sensor (e.g., similar construction to sensor assembly **2920**). Sensor assembly retaining region **3130** may include clips **3131** for retaining the board and as fastener receptacle **3132** for receiving a fastener that further secures the sensor assembly to adapter **421**. FIGS. **31**D and **31**E show exhaust duct interface **3140** that is configured to receive exhaust duct **422**. If desired, exhaust duct interface **3140** can include retention features to lock duct **422** into place.

[0230] FIGS. **32**A-**32**E show different views of duct **422** according to an embodiment. Duct **422** connects adapter **421** to exhaust fan housing **423**. Duct **422** transitions in shape from a rectangular shape (adjacent to adapter **421**) to a circular shape (adjacent to exhaust fan housing **423**). The circular shape can promote less turbulent airflow of air being injected into air dispersion manifold **424** by the exhaust fan. Duct **422** can include adapter interface portion **3210**, transition portion **3220**, and fan housing interface portion **3230**. Adapter interface portion **3210** can be configured to fit inside adapter **421** and be secured to liner structure **310** via mounting feet **3202**. If desired, a gasket or other type of seal may be used to form an airtight seal between portion **3210** and adapter **421**. Adapter portion **3210** can exhibit a substantially rectangular cross-section that is relatively thin to accommodate vertical height travel downwards along the height of the OMPA. Transition portion **3220** can transition a general shape of duct **422** from a rectangular cross-section of portion **3210** to a circular cross-section of portion **3230**. In addition, transition portion **3220** is configured to position portion **3230** in the appropriate position to connect to exhaust fan housing **423**. Fan housing interface portion **3230** can include articulating region **3232** to provide additional flexibility for enabling interface member **3234** to engage with and be secured to fan housing **423**. In some embodiments, interface member **3234** can be press fit onto fan housing **423** and secured in place with retention pockets **3235**, which can engage with retention tabs (not shown) extending from fan housing **423**.

[0231] FIGS. **33**A-**33**C show how the air treatment system, in particular, fan housing **423**, is coupled to air dispersion manifold **424** by being secured to a rear portion of midframe **412**. Air dispersion manifold **424** can be an integral part of midframe **412** that can be formed as part of an injection molding or extrusion process. Fan housing **423** is positioned adjacent to inlet port **3311**, which receives untreated air drawn in from the bucket assembly by the fan contained in fan housing **423**. Fan housing **423** may be aligned an angle, a, (shown in FIG. **33**C) to maximize uniform air flow distribution by air dispersion manifold **424**. In some embodiments, an angle, a of 18-22 degrees or about 20 degrees has been found to maximize uniform airflow dispersion for the shape geometry of manifold **424**. Uniform air flow distribution is desired so that the activated carbon (or other odor absorption media) contained in an air treatment chamber (shown in FIGS. **34**A and **34**B) is worn evenly. Various different views of air dispersion manifold **424** are shown in FIGS. **33**D-**33**F. The shape geometry of expansion chamber **3312** can be specifically tuned to ensure air is as evenly distributed as possible as it exits outlet port **3313** and passes through the air treatment chamber.

[0232] Air dispersion manifold **424** may have track members **3320** (FIG. **33**F) that are configured to receive sliding members of a removable drawer (e.g., removable drawer **3600** of FIG. **36**) configured to contain the air treatment chamber. Each track member **3320** may have recess members **3321** and **3322** to assist the user in inserting the removable drawer (and air treatment chamber contained therein) and for ensuring that the user properly seats removable drawer (and by default, the air treatment chamber) on top outlet port **3313**. Recess member **3321** is smaller in dimensions than recess member **3322**. The sliding members of the removable drawer may be sized to have similarly sized engagement members to respectively fit recess members **3321** and **3322**.

[0233] FIG. **34** shows a partial backside view of the OMPA with air treatment chamber cover **211** and removable drawer removed to show air treatment chamber (ATC) **3400**. In one embodiment, the user may remove cover **211** to access ATC **3400** by removing it or installing a new one. In another embodiment, the user may remove cover **211** to remove the removable drawer. Air passes through ATC **3400** into air chamber **3410** and passes out of exhaust ports **210** (which are integrated into spine member **203**). Air chamber **3410** may be an internal cavity that is integral part of midframe **412** (as shown in FIGS. **33**C and **33**D).

[0234] FIG. **35** shows an illustrative cross-sectional view of the OMPA with emphasis on air flow path for treated air. Air chamber **3410** may be fluidically connected to air chamber **3510**, which can be defined by spine member **203**, mass bracket **414**, backplate **3512**, backplate foam **3514**, and air seal member **3516**. FIG. **35** shows midframe **412** connected to mass bracket **414**, mass bracket **414** connected to backplate **3512**, backplate **3512** connected to backplate foam **3514**. Collectively, midframe **412**, mass bracket **414**, backplate **3512**, and backplate foam **3514** form a boundary of air chamber **3510**. Air chamber **3510** is also bounded by air seal member **3516**, which interfaces with backplate foam **3514**. The interface between air seal member **3516** and backplate foam **3514** can form the top boundary of air chamber **3510**. Spine member **203**, itself, forms another boundary of air chamber **3510**.

[0235] FIGS. **36**A-**36**E show different views of removable drawer **3600** configured to receive a load of air treatment media (e.g., activated carbon) or a container filled with air treatment media. Drawer **3600** may be the same as removable panel **211**, discussed above. Drawer **3600** can include body **3610**, which is a multifaceted part including cavity **3611** defined by perforated bottom wall **3612** and side walls **3613**, gasket **3614**, sliding members **3615**, cosmetic member **3618**, and screw retention members **3619**. Drawer **3600** can include cover **3620** that can be affixed to the top of cavity **3611** and held in place with screws or other fasteners that engage screw retention members **3619**. Cover **3620** can include perforated holes **3622** may be similar to in size to the holes in perforated bottom wall **3612**. The holes allow treated air being pulled in from the bucket assembly to be uniformly pushed through cavity **3611** and the air treatment media contained therein. This embodiment of drawer **3600** can also include media cartridge **3630**, which is secured within cavity **3611**. Media cartridge **3630** is a user-removable and installable container that can be removed from or installed into cavity **3611** of body **3610**. The container may be of plastic or metal construction and contains air treatment media (e.g., activated carbon or other odor adsorbing material). The container has top and bottom openings for allowing air to pass through the container. An air permeable foam or other substrate may be positioned adjacent to both the top and bottom openings to contain the air treatment media within the container. When a user first interacts with cartridge **3630**, the user may be required to remove adhesive film covering the top and bottom openings to allow air to flow through the cartridge. The adhesive film coverings may prevent premature deactivation and/or spillage of the air treatment media (e.g., activated carbon) during shipment of the OMPA and/or media cartridge unit. Alternatively, a removable cap or lid may be removed from the top and bottom side of the cartridge unit. In yet another embodiment, structurally embedded caps or lids may exist as part of the cartridge unit and such caps or lids may be removed using a pull tab, or a key that is used to roll a metal layer around the periphery of each opening, or a can opener.

[0236] Drawer **3600** is configured to slide into air dispersion manifold **424** and sit in a sealed position therein when sliding members **3615** are fully seated within respective track members **3320**. Drawer **3600** may be sealed when gasket **3614** forms a seal with air dispersion manifold **424**. In particular, engagement tabs **3616** and **3617** may engage recess members **1321** and **1322** when drawer **3600** is fully seated and sealed to air dispersion manifold **424**. In addition, when drawer **3600** is fully seated, cosmetic member **3618** may be aligned with spine member **204**, the side walls of the OMPA, and bottom housing **410** (as shown in FIGS. **2**B and **2**D).

[0237] In some embodiments, cartridge **3630** is not used and cavity **3611** is directly filled with air treatment media and contained between cover **3620** and bottom wall **3612**. If desired, an air permeable layer (e.g., foam) may be placed on top of bottom wall **3612** to prevent air treatment media from passing through the holes in bottom wall **3612**. When air treatment media requires replacing, the user can remove cover **3620**, dump out the old air treatment media, insert new air treatment media, and replace cover **3620**.

[0238] FIGS. **37**A-**37**H show different views of lid locking mechanism **3700** according to an embodiment. In particular, FIG. **37**A shows a partial cross-sectional view of the OMPA with emphasis on lid **204** and lid locking mechanism **3700**, FIG. **37**B shows a partial exploded view of lid **204**, lid locking mechanism **3700**, and liner structure **310**, FIG. **37**C shows an illustrative partial front view of lid locking mechanism **3700** in a locked position, FIG. **37**D shows an illustrative partial front view lid locking mechanism **3700** in an unlocked position, FIG. **37**E show a partial perspective view of mechanism **3700** and lid **204** with liner structure **310** removed, FIG. **37**F shows a partial perspective view of cam lock in an unlocked position, FIG. **37**G shows a partial perspective view of cam lock in a locked position, and FIG. **37**H shows a close up view of a latch cam and a sliding block. Referring generally to FIGS. **37**A-**37**H, collectively, a general overview of lid locking mechanism **3700** and lid **204** is discussed. Lid **204** can include lid plate **204*a***, which is attached to hinge plate **440**, latch member **204*b***, lid cover **204*c***, and lid veneer **204*d***. Latch member **204*b*** can be an integral part of lid plate **204*a***. Lid cover **204*c*** may be secured to the top of lid plate **204*a*** and lid veneer **204*d*** can be secured to the top of lid cover **204*c***. Gasket **205** may be secured to a bottom surface of lid plate **204*a***.

[0239] Lid lock mechanism can include bracket **3710**, latch cam **3720**, cam screw **3722**, latch sliding block **3730**, solenoid **3731**, spring **3732**, retaining screw **3733**, bump stop **3736**, sensor **3740**. Bracket **3710** is secured to liner structure **310** and provides a mounting point for cam screw **3722** to secure latch cam **3720** in place so that latch cam **3720** can rotate in conjunction with movement of sliding block **3730**. Latch cam **3720** can include a cutout or grove channel **3721** that interfaces rod member **3734** extending from sliding block **3730**. Latch cam **3720** can also include lid engagement member **3724** operative to engage with latch member **204*b***. Sliding block **3730** can be movably coupled to the liner structure **310** via retaining screw **3733**. Solenoid **3731** can also be secured to liner structure **310** and to sliding block **3730**. Spring **3732** may exist between solenoid **3731** and sliding block **3730**. Solenoid pin **3731*a*** may connect sliding block **3730** to solenoid **3731**. When solenoid **3731** is active, it can pull sliding block **3730** to a locked position (shown in FIGS. **37**C, **37**E, and **37**G), which causes latch cam **3720** to rotate and engage latch member **204*b***. In the locked position, sliding block **3730** may engage sensor **3740** (e.g., a switch) to confirm to a control system of the OMPA that the lid is locked. When solenoid **3731** is not active, spring **3732** may push sliding block to an unlocked position (shown in FIGS. **37**D and **37**F), which causes latch cam **3720** to disengage with latch member **204*b***. Bump stop **3736** may protect sliding block **3730** from harsh impacts when spring **3732** returns sliding block **3730** to the unlocked position. In the unlocked position, sliding block **3730** does not engage sensor **3740**, thereby indicating to the control system that lid is not locked.

[0240] Bracket **3710** may also serve as a platform for circuit board **3711** on which UI elements **3712** and button **3713** may reside. UI elements **3712** and button **3713** can be positioned under respective cutouts in liner structure **310** to enable users to view the UI elements **3712** and interact with button **3713**.

[0241] FIG. **38** shows an illustrative block diagram of OMPA **3800** including bucket **3801**, impeller **3802**, OMPA input **3803**, lid **3804**, magnet **3805**, reed switch **3806**, and load cell **3807**. Load cell **3807** is operative to measure mass of the bucket and any contents contained therein (e.g., include impeller **3802** and any OMPA input **3803**). When OMPA input **3803** is pressing up on lid **3804**, this can impart a downward force into the bucket that is measured as an increase in mass by load cell **3807**. If the measured mass increase exceeds a mass threshold within a fixed period of time (e.g., a sudden spike in measured mass), this may trigger the first indicator, resulting in motor reversal. The mass threshold and the fixed period of time can be selected to promote motor reversal that pre-empts a lid opening event. Moreover, the mass threshold and fixed period of time can be further selected to detect a mass spike event before reed switch **3806** registers that lid **3804** is open. Thus, the mass spike can be detected while the lid ever so slightly begins to open and before reed switch **3806** registers an open event. An open event, as detected per reed switch **3806**, cuts power to the motor. Therefore, it is desirous to detect the mass spike event and reverse motor direction before reed switch **3806** signals to a control unit that power to the motor should be cut off.

[0242] FIG. **39** shows bucket **3800** having a lid **3804** in an open position at time, T**1**, and closed at time T**2**, according to an embodiment. When lid **3804** is open, reed switch **3806** can send a signal to a control unit that then causes power to be cut off from the motor, thereby ceasing impeller **3802** rotation. If OMPA input **3802** is propping lid **3804** open and a user is not depressing a pedal, which would cause lid **3804** to open, the OMPA can notify the user of an open lid event via an application or by displaying an icon or lights on the unit itself. When lid **3804** is closed, reed switch **3806** may send a signal to the control unit, which then enables power to the motor. However, in response to each lid closure event, the motor direction is reversed and impeller **3802** rotates in the opposite direction.

[0243] FIG. **40** shows an illustrative process **4000** for preventing lid opening events during OMPA processing according to an embodiment. Process **4000** may start an OMPA processing cycle (e.g., a dry and grind cycle) at step **4010**. At step **4020**, a load cell (e.g., load cell **3807**) can monitor mass readings to determine if a mass spike event occurs. A mass spike event can be characterized by sudden and rapid increase in detected mass within a relatively short time frame. If the lid is closed and the load cell monitors a rapid change in detected mass, then this may indicate that OMPA input is pressing up on the lid and exerting a downward force into the bucket, which downward force is registered as an increase in mass. As discussed above, the mass spike can occur if a change in mass (e.g., a positive change in mass) exceeds a mass change threshold within a fixed period of time. For example, if the mass change exceeds 750 grams in less than 5 seconds, this may qualify as a mass spike event. These numbers are merely illustrative and it should be understood that any suitable mass and time threshold can be used as appropriate.

[0244] If a mass spike event is detected at step **4022**, process **4200** may immediately stop motor action and reverse direction of the motor at step **4024**. Stoppage and subsequent reversal of motor direction is preferably performed before the lid opens. At step **4026**, the motor can be instructed to continue running in the new reversed direction for a minimum fixed period of time (e.g., 30 seconds, 1 minute, 5 minutes, 10 minutes, etc.), for example, to provide ample opportunity for whatever item that was causing the mass spike event to settle down into the bucket. This minimum runtime may be overridden by a lid open event but the general principle is to allow the motor to rotate in the new direction for the minimum runtime and ignore any mass spike events that may be detected during that minimum runtime. Process **4000** continues the OMPA processing cycle at step **4010**.

[0245] If no mass spike event is detected at step, **4022**, process **4000** can proceed to step **4030**, which assesses whether the lid sensor (e.g., reed switch **3806**) detects a lid open event. If no lid open event is detected, process **4000** proceeds to step **4010**. If a lid open event is detected, the motor is stopped at step **4032**. At step **4034**, the lid sensor assesses whether a lid close event is detected. A lid close event can be asynchronously detected. If a lid close event is detected at step **4034**, the motor direction is reversed at step **4036** and the OMPA processing cycle continues at step **4010**. If, at step **4034**, no lid close event is detected following a motor stoppage at step **4032**, it may be inferred that the bucket is overfilled and requires user assistance. The user may be notified of the overfilled bucket at step **4040** and the OMPA processing cycle may end at step **4042**. If the user removes the obstruction and a lid close event is detected at step **4034**, process **4000** can proceed to step **4036**.

[0246] It should be understood that the steps shown in FIG. **40** are merely illustrative and that additional steps may be added, steps may be omitted, or the order of the steps may be rearranged. For example, there may be multiple instances of notifications to the user that the lid is open. As a specific example, a first notification may be actioned when the lid has been stuck open for a first period of time (e.g., 5 minutes) to prompt the user to remove the obstruction and allow the cycle to proceed automatically upon lid close detected, and a second notification (e.g., after 2 hours of lid stuck open) when the cycle is completely cancelled and will not resume even if the lid is then closed.

[0247] FIG. **13** illustrates a network environment **1300** that includes a control platform **1302**. For the purpose of illustration, the control platform **1302** may be described as a computer program that is executing on an electronic device **1304** accessible to a user of OMPA **1312**. As discussed above with reference to FIG. **1**, OMPA **1312** may include a communication module that is responsible for receiving data from, or transmitting data to, the electronic device **1304** on which the control platform **1302** resides.

[0248] Users may be able to interface with the control platform **1302** via interfaces **1306**. For example, a user may be able to access an interface through which information regarding OMPA **1312** can be viewed. This information may include historical information related to past performance (e.g., total pounds of OMPA input that has been processed), or this information may include state information related to current activity (e.g., the current state of OMPA **1312**, an indication of whether OMPA **1312** is presently connected to the electronic device **1304**, an indication of whether OMPA **1312** is presently locked). Thus, a user may be able to educate herself on the OMPA and its contents by reviewing content posted to interfaces generated by the control platform **1302**.

[0249] Moreover, a user may be able to access an interface through which instructions can be provided to OMPA **1312**. Said another way, the user may be able to specify, through the control platform **1302**, when or how OMPA **1312** should process OMPA input stored therein. As an example, the OMPA **1312** may initially be configured to perform high intensity processing between 10 PM and 8 AM under the assumption that its ambient environment will generally be devoid of individuals during that timeframe. However, the user may be able to adjust aspects of setup or operation of OMPA **1312** through the control platform **1302**. For instance, the user could specify that high intensity processing should not begin until 2 AM, or the user could specify that high intensity processing should not end after 6 AM.

[0250] A user could also program, through the control platform **1302**, a preference regarding the weight at which to empty the processing chamber of OMPA **1312**. On its own, the processing chamber may weigh 8-10 pounds. The total weight of the processing chamber (including its contents) can quickly become unwieldy for some users, such as elderly individuals and juvenile individuals. Accordingly, the control platform **1302** may permit users to define a weight at which to generate notifications (also referred to as "alarms"). Assume, for example, that a user indicates that the total weight of the processing chamber (including its contents) should not exceed 15 pounds through an interface generated by the control platform **1302**. In such a scenario, the control platform **1302** may monitor mass measurements received from OMPA **1312** and then generate a notification in response to determining that the total weight of the processing chamber (including its contents) is within a certain amount of 15 pounds. The certain amount may be a fixed value (e.g., 1 pound or 2 pounds), or the certain amount may be a dynamically determined value (e.g., 5 percent or 10 percent of the weight specified by the user).

[0251] The notification could be presented in various ways. In embodiments where the control platform **1302** is implemented as a computer program executing on an electronic device **1304** as shown in FIG. **13**, the notification may be generated by the computer program (e.g., in the form of a push notification). Additionally or alternatively, the control platform **1302** may transmit an instruction to OMPA **1312** to generate the notification. Accordingly, the notification could be a visual, audible, or tactile notification that is generated by the electronic device **1304** or OMPA **1312**.

[0252] As shown in FIG. **13**, the control platform **1302** may reside in a network environment **1300**. Thus, the electronic device **1304** on which the control platform **1302** is implemented may be connected to one or more networks **1308**A-C. These networks **1308**A-C may be personal area networks (PANs), local area networks (LANs), wide area networks (WANs), metropolitan area networks (MANs), cellular networks, or the Internet. Additionally or alternatively, the electronic device **1304** could be communicatively connected to other electronic devices—including OMPA **1312**—over a short-range wireless connectivity technology, such as Bluetooth, NFC, Wi-Fi Direct (also referred to as "Wi-Fi P2P"), and the like.

[0253] In some embodiments, at least some components of the control platform **1302** are hosted locally. That is, part of the control platform **1302** may reside on the electronic device **1304** that is used to access the interfaces **1306** as shown in FIG. **13**. For example, the control platform **1302** may be embodied as a mobile application that is executable by a mobile phone. Note, however, that the mobile application may be communicatively connected to (i) OMPA **1312** and/or (ii) a server system **1310** on which other components of the control platform **1302** are hosted.

[0254] In other embodiments, the control platform **1302** is executed entirely by a cloud computing service operated by, for example, Amazon Web Services®, Google Cloud Platform™, or Microsoft Azure®. In such embodiments, the control platform **1302** may reside on a server system **1310** that is comprised of one or more computer servers. These computer servers can include different types of data (e.g., regarding batches of product that have been produced by OMPAs associated with different users), algorithms for implementing the routine described above (e.g., based on knowledge regarding ambient temperatures, humidity, etc.), algorithms for tailoring or training the routine described above (e.g., based on knowledge gained from nearby OMPAs or comparable OMPAs), and other assets (e.g., user credentials). Those skilled in the art will recognize that this information could also be distributed amongst the server system **1310** and one or more other electronic devices. For example, some data that is generated by a given OMPA may be stored on, and processed by, that OMPA or an electronic device that is "paired" with that OMPA. Thus, not all data generated by OMPAs—or even the control platform—may be transmitted to the server system **1310** for security or privacy purposes.

[0255] One benefit of having a network-connected OMPA is that it enables connectivity with other electronic devices, and thus integration into related systems.

[0256] Assume, for example, that a user purchases and then deploys a OMPA in a home. This OMPA may include a set of instructions (also referred to as the "intelligent time recipe") that, when executed, indicate how its components are to be controlled. These instructions may involve the execution of heuristics, algorithms, or computer-implemented models. Rather than learn best practices "from scratch," the OMPA (or a control platform to which it is communicatively connected) may be able to learn from the experiences of other OMPAs. These OMPAs may be located nearby, and therefore may experience comparable ambient conditions such as humidity, temperature, and the like. Alternatively, these OMPAs may be comparable, for example, in terms of amount of actual or expected OMPA input, type of actual or expected OMPA input, number of users (e.g., a single individual versus a family of four individuals), etc. Thus, knowledge may be shared among OMPAs as part of a networked machine learning scheme. Referring again to the above-mentioned example, the OMPA may initiate a connection with a control platform after being deployed in the home. In such a scenario, the control platform may provide another set of instructions that is learned based on knowledge gained by the control platform from analysis of the activities of other OMPAs. Accordingly, the control platform may further develop instruction sets based on machine learning. Learning may be performed continually (e.g., as OMPAs perform activities and generate data), and insights gained through learning may be provided continually or periodically. For instance, the control platform may communicate instructions to a OMPA whenever a new set is available, or the control platform may communicate a new set of instructions to an OMPA only upon receiving input (e.g., from the corresponding user) indicating that the OMPA is not operating as expected.

[0257] As another example, assume that a municipality is interested in collecting the products produced by various OMPAs for further processing (e.g., composting). In such a scenario, the municipality may be interested in information such as the weight and water content of product that is available for collection. Each OMPA may not only have the sensors needed to measure these characteristics as discussed above but may also have a communication module that is able to transmit measurements elsewhere. In some embodiments, these OMPA directly transmit the measurements to the municipality (e.g., by uploading to a network-accessible data interface, such as an application programming interface). In other embodiments, these OMPAs indirectly transmit the measurements to the municipality (e.g., by forwarding to respective control platforms, which then transmit the measurements—or analyses of the measurements—onward to the municipality). With these measurements, the municipality may be able to retrieve, transport, and handle the products produced by these OMPAs in a more intelligent manner. For example, the municipality may have a better understanding of when retrieval needs to occur, and how much storage space is needed for the products, if the weight is shared.

[0258] Users may also be able to communicate with one another, directly or indirectly, through OMPA. Assume, for example, that a first OMPA has finished processing its OMPA input into a product. Although processing is complete, a corresponding first user may not be ready to offload the product. In such a situation, a second user who is located nearby (e.g., as determined based on information generated by the respective OMPA, information input by the respective users, etc.) may offer to handle the product. For instance, the second user may retrieve the product from the first user and then handle it, add it to her own product, etc. Users may be able to communicate through the interfaces **1306** generated by the control platform **1302**, or users may be able to communicate directly through their respective OMPAs.

Computing System

[0259] FIG. **14** is a block diagram illustrating an example of a computing system **1400** in which at least some operations described herein can be implemented. For example, components of computing system **1400** may be hosted on an OMPA that is tasked with converting OMPA input into a more stable product. As another example, components of the computing system **1400** may be hosted on an electronic device that is communicatively connected to an OMPA.

[0260] The computing system **1400** may include a controller **1402**, main memory **1406**, non-volatile memory **1410**, network adapter **1412**, display mechanism **1418**, input/output (I/O) device **1420**, control device **1422**, drive unit **1424** including a storage medium **1426**, and signal generation device **1430** that are communicatively connected to a bus **1416**. The bus **1416** is illustrated as an abstraction that represents one or more physical buses or point-to-point connections that are connected by appropriate bridges, adapters, or controllers. The bus **1416**, therefore, can include a system bus, a Peripheral Component Interconnect (PCI) bus or PCI-Express bus, a HyperTransport or industry standard architecture (ISA) bus, a small computer system interface (SCSI) bus, a universal serial bus (USB), inter-integrated circuit (I2C) bus, or an Institute of Electrical and Electronics Engineers (IEEE) standard 1394 bus (also referred to as "Firewire").

[0261] While the main memory **1406**, non-volatile memory **1410**, and storage medium **1426** are shown to be a single medium, the terms "machine-readable medium" and "storage medium" should be taken to include a single medium or multiple media (e.g., a database distributed across more than one computer server) that store instructions **1428**. The terms "machine-readable medium" and "storage medium" shall also be taken to include any medium that is capable of storing, encoding, or carrying instructions for execution by the computing system **1400**.

[0262] In general, the routines executed to implement the embodiments of the present disclosure may be implemented as part of an operating system or a specific computer program. Computer programs typically comprise instructions (e.g., instructions **1404**, **1408**, **1428**) that are set at various times in various memory and storage devices in an electronic device. When read and executed by controller **1402**, the instructions cause the computing system **1400** to perform operations to execute various aspects of the present disclosure.

[0263] The network adapter **1412** enables the computing system **1400** to mediate data in a network **1414** with an entity that is external to the computing system **1400** through any communication protocol that is supported by the computing system **1400** and the external entity. The network adapter **1412** can include a network adapter card, wireless network interface card, router, access point, wireless router, switch, protocol converter, gateway, bridge, hub, digital media receiver, repeater, or any combination thereof.

[0264] For a firmware and/or software implementation, the methodologies may be implemented with modules (e.g., procedures, functions, and so on) that perform the functions described herein. Any machine-readable medium tangibly embodying instructions may be used in implementing the methodologies described herein. For example, software codes may be stored in a memory. Memory may be implemented within the processor or external to the processor. As used herein the term "memory" refers to any type of long term, short term, volatile, nonvolatile, or other storage medium and is not to be limited to any particular type of memory or number of memories, or type of media upon which memory is stored.

[0265] Moreover, as disclosed herein, the term "storage medium" may represent one or more memories for storing data, including read only memory (ROM), random access memory (RAM), magnetic RAM, core memory, magnetic disk storage mediums, optical storage mediums, flash memory devices and/or other machine readable mediums for storing information. The term "machine-readable medium" includes, but is not limited to portable or fixed storage devices, optical storage devices, wireless channels, and/or various other storage mediums capable of storing that contain or carry instruction(s) and/or data.

[0266] Having described several embodiments, it will be recognized by those of skill in the art that various modifications, alternative constructions, and equivalents may be used without departing from the spirit of the invention. Additionally, a number of well-known processes and elements have not been described in order to avoid unnecessarily obscuring the present invention. Accordingly, the above description should not be taken as limiting the scope of the invention.

[0267] Where a range of values is provided, it is understood that each intervening value, to the tenth of the unit of the lower limit unless the context clearly dictates otherwise, between the upper and lower limits of that range is also specifically disclosed. Each smaller range between any stated value or intervening value in a stated range and any other stated or intervening value in that stated range is encompassed. The upper and lower limits of these smaller ranges may independently be included or excluded in the range, and each range where either, neither or both limits are included in the smaller ranges is also encompassed within the invention, subject to any specifically excluded limit in the stated range. Where the stated range includes one or both of the limits, ranges excluding either or both of those included limits are also included.

[0268] As used herein and in the appended claims, the singular forms "a", "an", and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to "a process" includes a plurality of such processes and reference to "the device" includes reference to one or more devices and equivalents thereof known to those skilled in the art, and so forth.

[0269] Also, the words "comprise," "comprising," "include," "including," and "includes" when used in this specification and in the following claims are intended to specify the presence of stated features, integers, components, or steps, but they do not preclude the presence or addition of one or more other features, integers, components, steps, acts, or groups.

What is claimed is:

1. A method for operating an organic matter processing apparatus (OMPA) comprising a lid, a bucket assembly comprising a metal housing, first and second impeller assemblies having respective first and second impeller couplers, and a blade array secured to a surface of the metal housing, a liner structure, a hot plate, a mass bracket secured to the liner structure, a load cell secured to the mass bracket, and a drivetrain assembly comprising first and second drive shafts coupled to a gearbox that is powered by a motor, the first and second drive shafts associated with respective first and second drivetrain couplers, the method comprising:

operating the OMPA according to an OMPA processing cycle;

monitoring the load cell for a mass spike event occurring during the OMPA processing cycle; and

in response to a monitored mass spike event:

stopping the motor;

reversing a direction of the motor; and

continuing the OMPA processing cycle.

2. The method of claim **1**, wherein the stopping the motor and the reversing the direction of the motor in response to the monitored mass spike event are executed to pre-empt opening of the lid by any OMPA input contained in the bucket assembly.

3. The method of claim **1**, further comprising:

in response to detecting a lid open event, stopping the motor.

4. The method of claim **3**, further comprising:

in response to detecting a lid closed event, resume operation of the motor in a reverse direction.

5. The method of claim **3**, further comprising:

in response to detecting that the lid has not closed, notifying a user of an overfilled bucket.

6. A method for operating an organic matter processing apparatus (OMPA), comprising:

operating the OMPA according to an OMPA processing cycle;

monitoring a load cell for a mass spike event occurring during the OMPA processing cycle; and

in response to a monitored mass spike event:

stopping a motor;

reversing a direction of the motor; and

continuing the OMPA processing cycle.

7. An organic matter processing apparatus (OMPA) comprising:

a bucket assembly comprising an impeller and a load cell

a motor operative to cause the impeller to rotate;

a lid operative to open and close; and

control circuitry operative to:

operate the OMPA according to an OMPA processing cycle;

monitor the load cell for a mass spike event occurring during the OMPA processing cycle; and

in response to a monitored mass spike event:

stop the motor;

reverse a direction of the motor; and

continue the OMPA processing cycle.

8. The OMPA of claim **7**, wherein the stopping the motor and the reversing the direction of the motor in response to the monitored mass spike event are executed to pre-empt opening of the lid by any OMPA input contained in the bucket assembly.

9. The OMPA of claim **7**, the control circuitry further operative to stop the motor in response to detecting a lid open event.

10. The OMPA of claim **8**, the control circuitry further operative to resume operation of the motor in a reverse direction in response to detecting a lid closed event.

11. The OMPA of claim **8**, the control circuitry further operative to notify a user of an overfilled bucket in response to detecting that the lid has not closed.

* * * * *