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(54) **TURBINE WITH IMPROVED SOUND REDUCTION**

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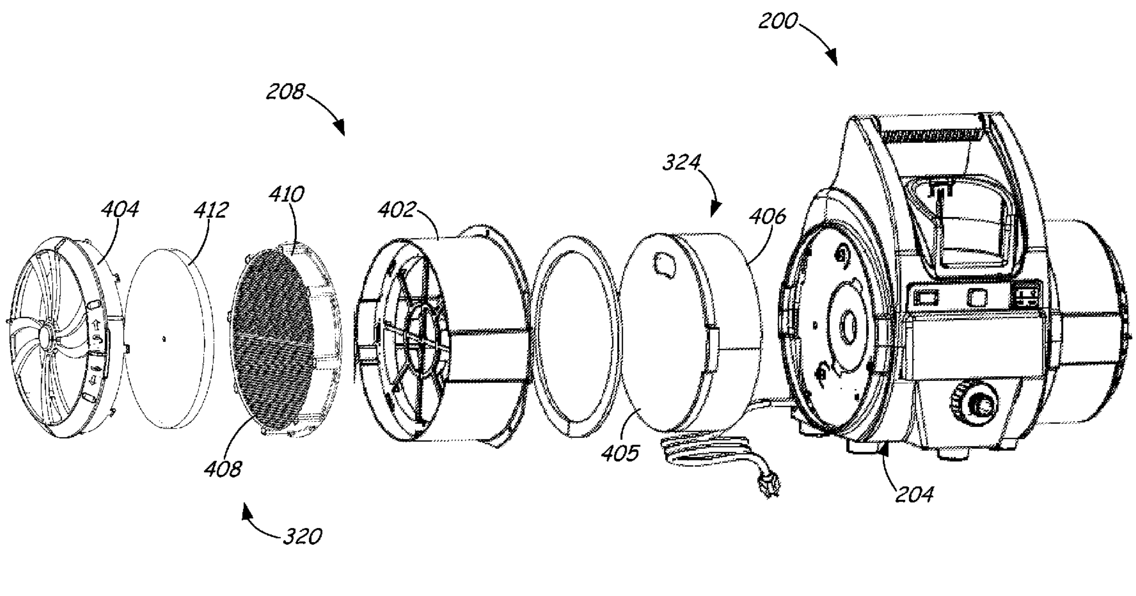
(57) **ABSTRACT**

The present disclosure generally relates to a turbine for a fluid delivery system and more specifically, but not by limitation, to a portable air turbine for a fluid delivery system having improved sound reduction. In one exemplary embodiment, a portable turbine apparatus is provided and includes a motor and a turbine configured to be driven by the motor for providing pressurized air to an outlet. A first inlet airflow path delivers air to the motor. A first silencer component having sound absorptive material is positioned along the first inlet airflow path and includes at least one orifice formed therethrough for the first inlet airflow path, the at least one orifice having a cross-sectional area of at least 0.01 square inches. A second inlet airflow path delivers air to the turbine. A second silencer component having sound absorptive material is positioned along the second inlet airflow path and includes at least one orifice formed therethrough for the second inlet airflow path, the at least one orifice having a cross-sectional area of at least 0.01 square inches.



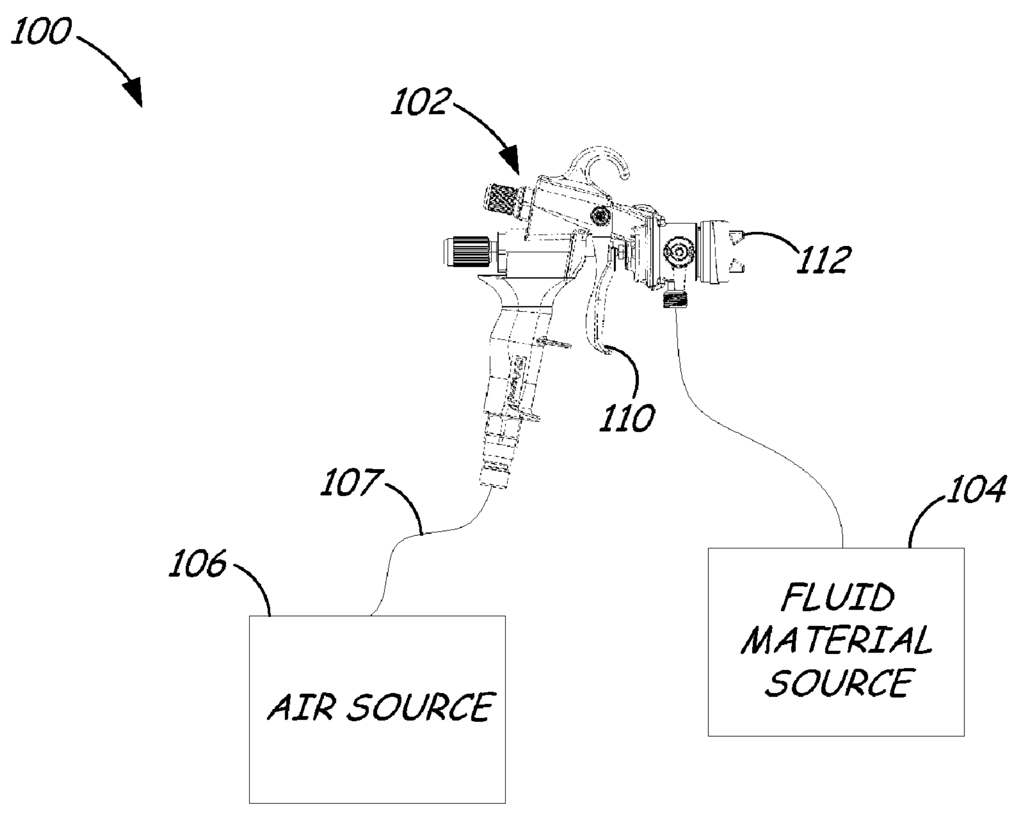


FIG. 1

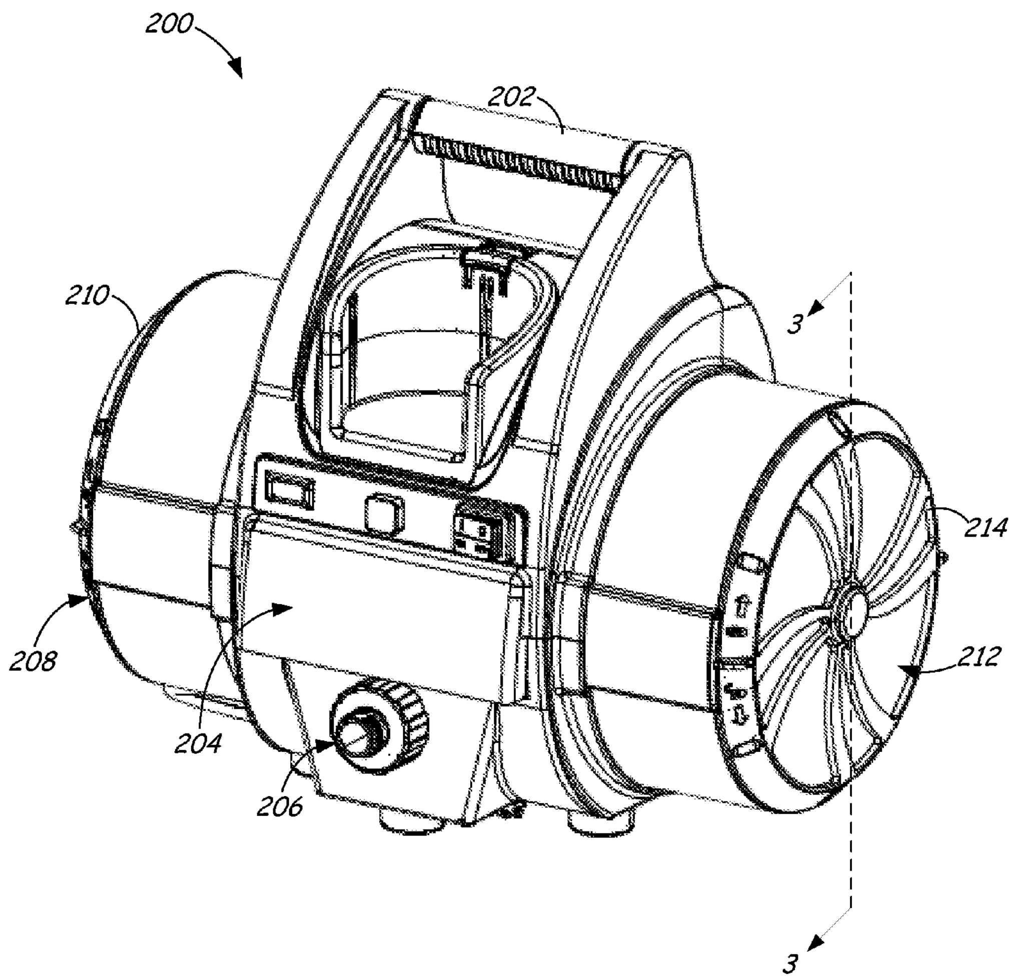


FIG. 2

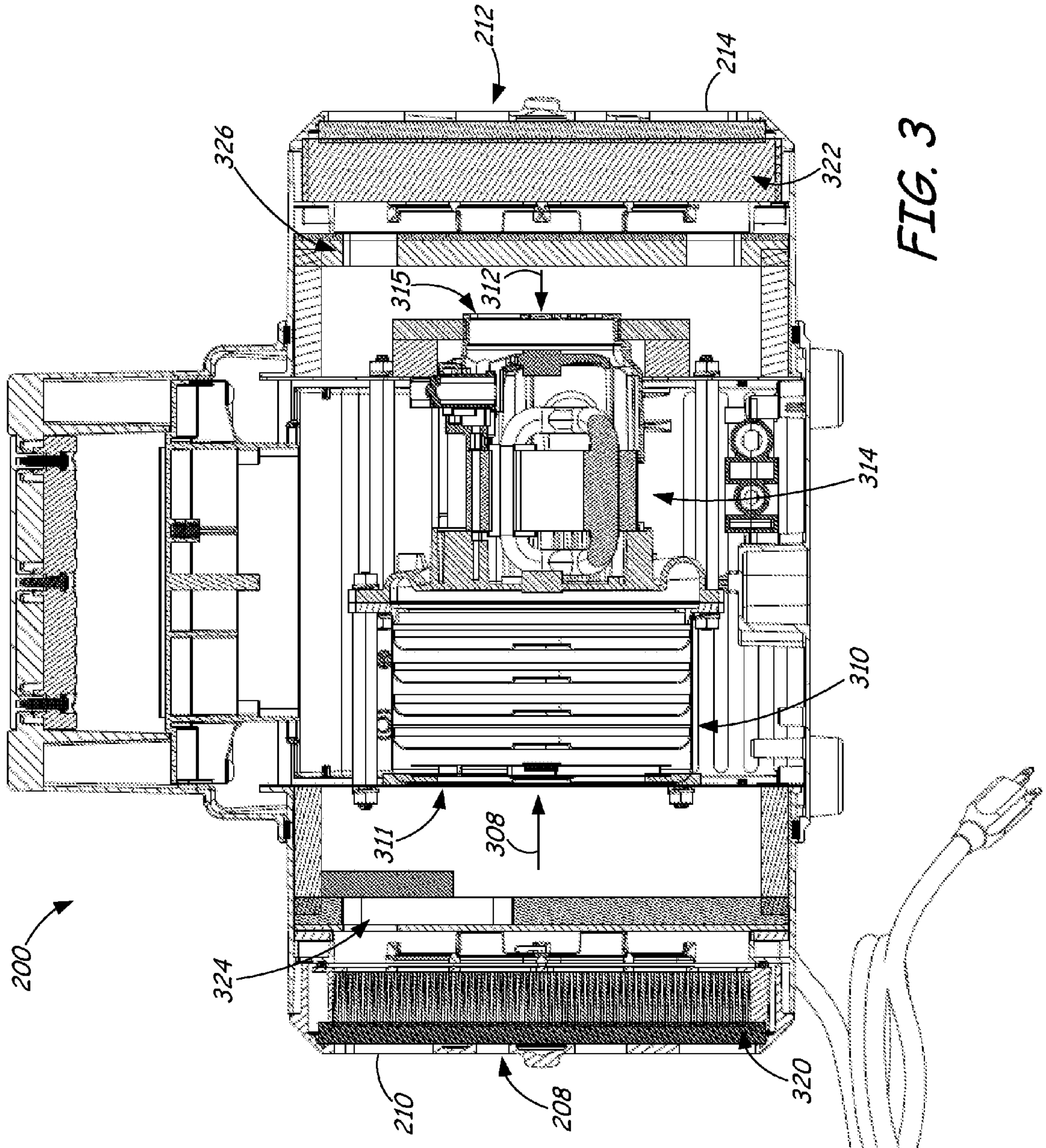


FIG. 3

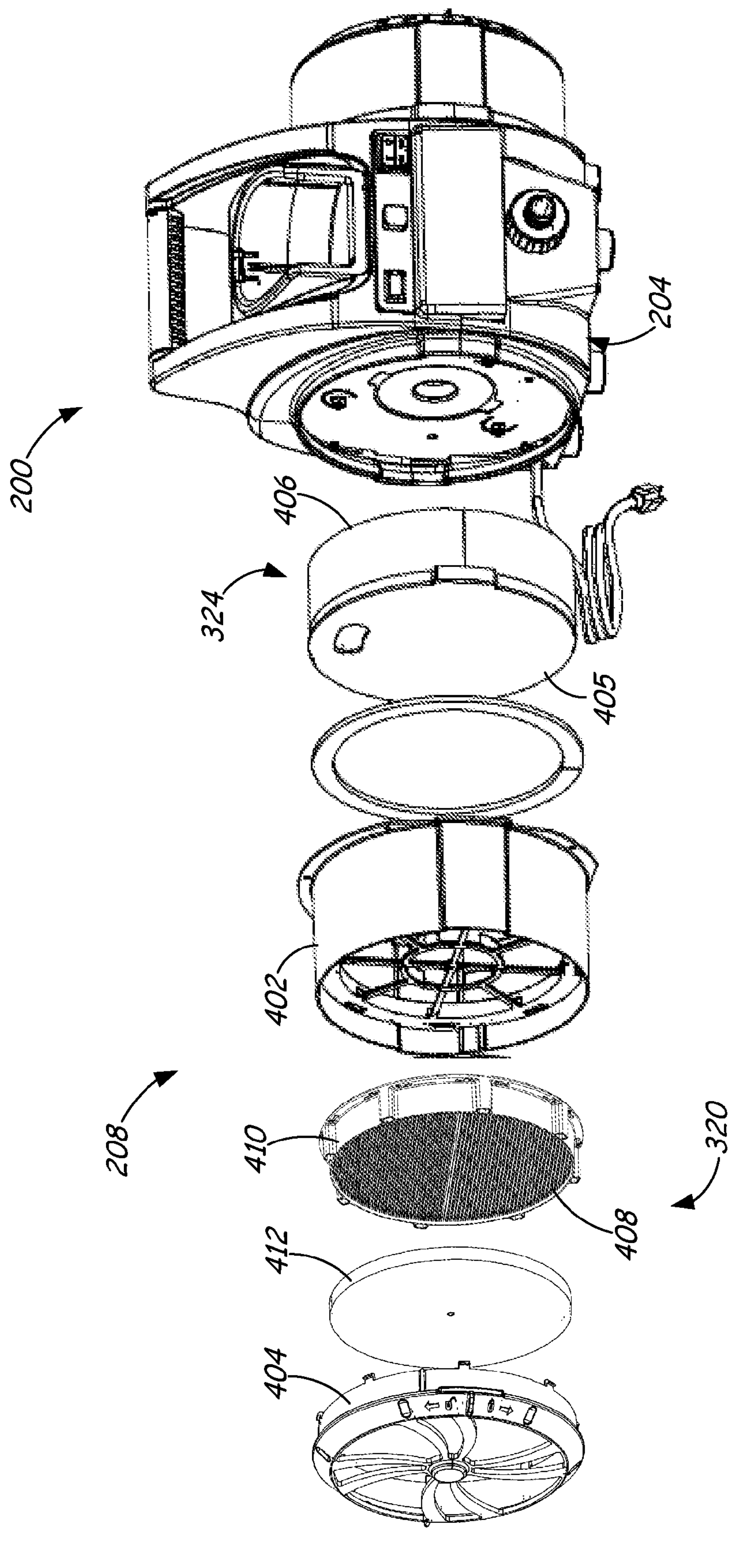


FIG. 4

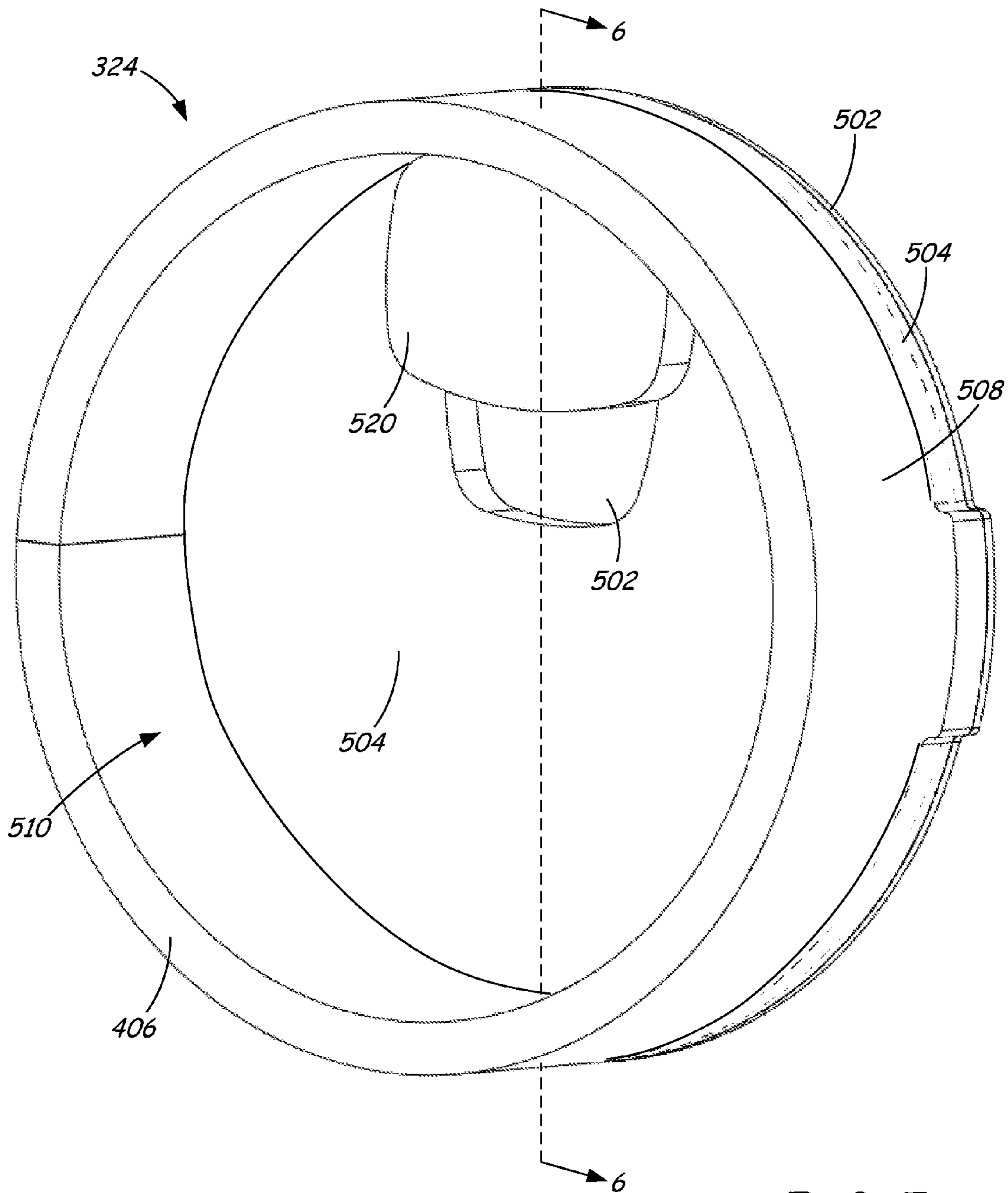


FIG. 5

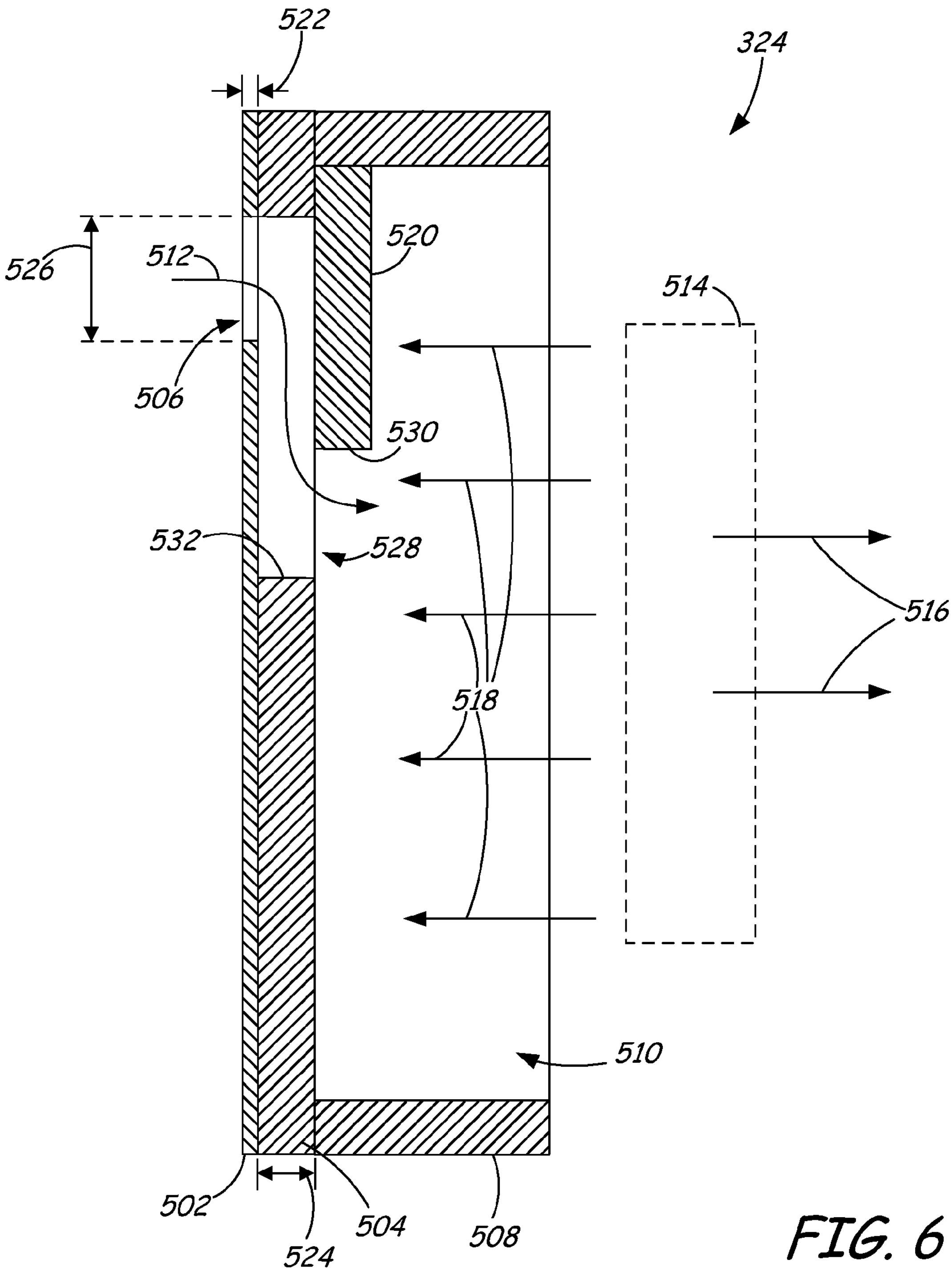

522
324
526
512
520
514
506
530
532
528
516
518
510
502
524
504
508

FIG. 6

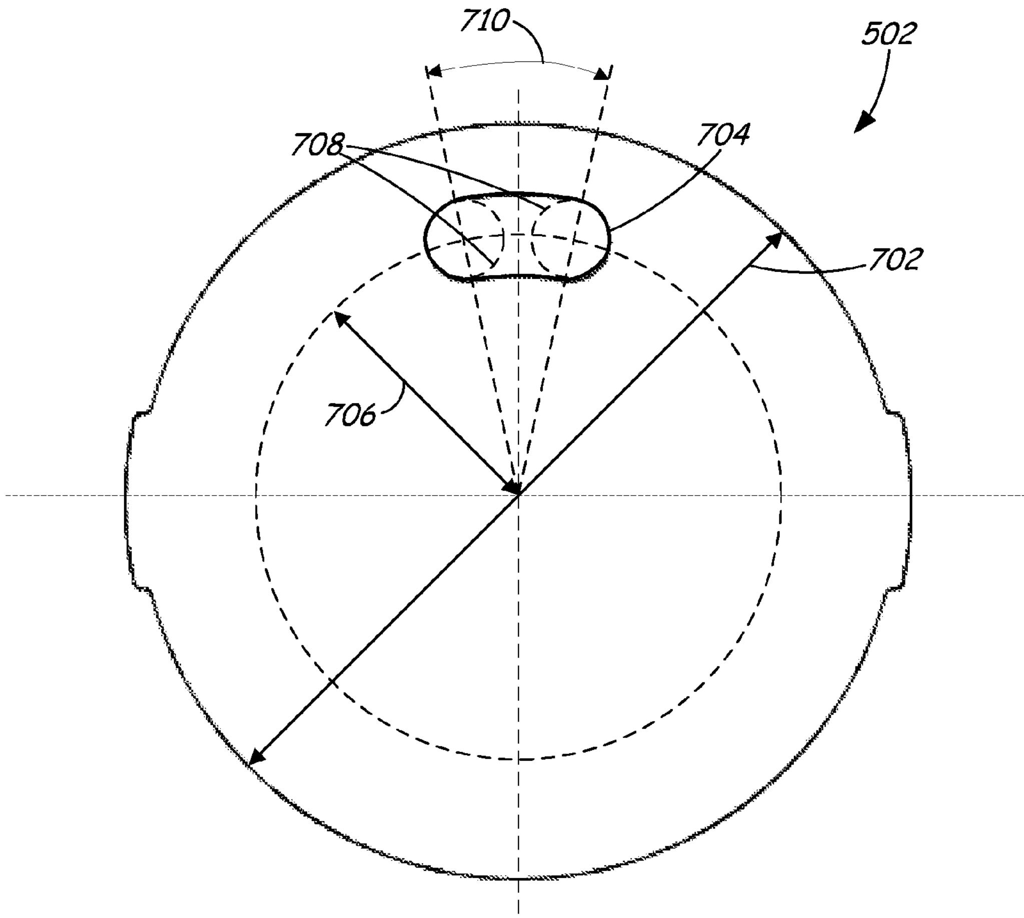


FIG. 7

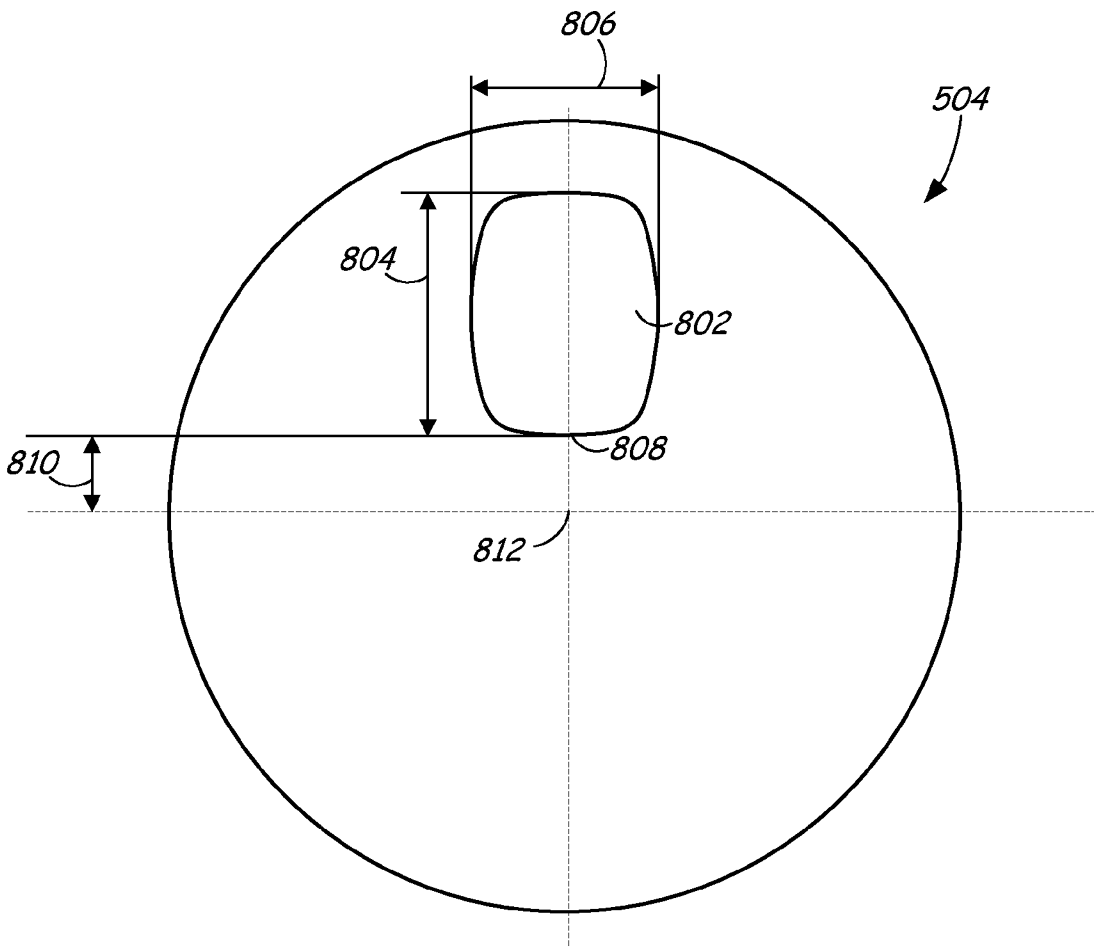


FIG. 8

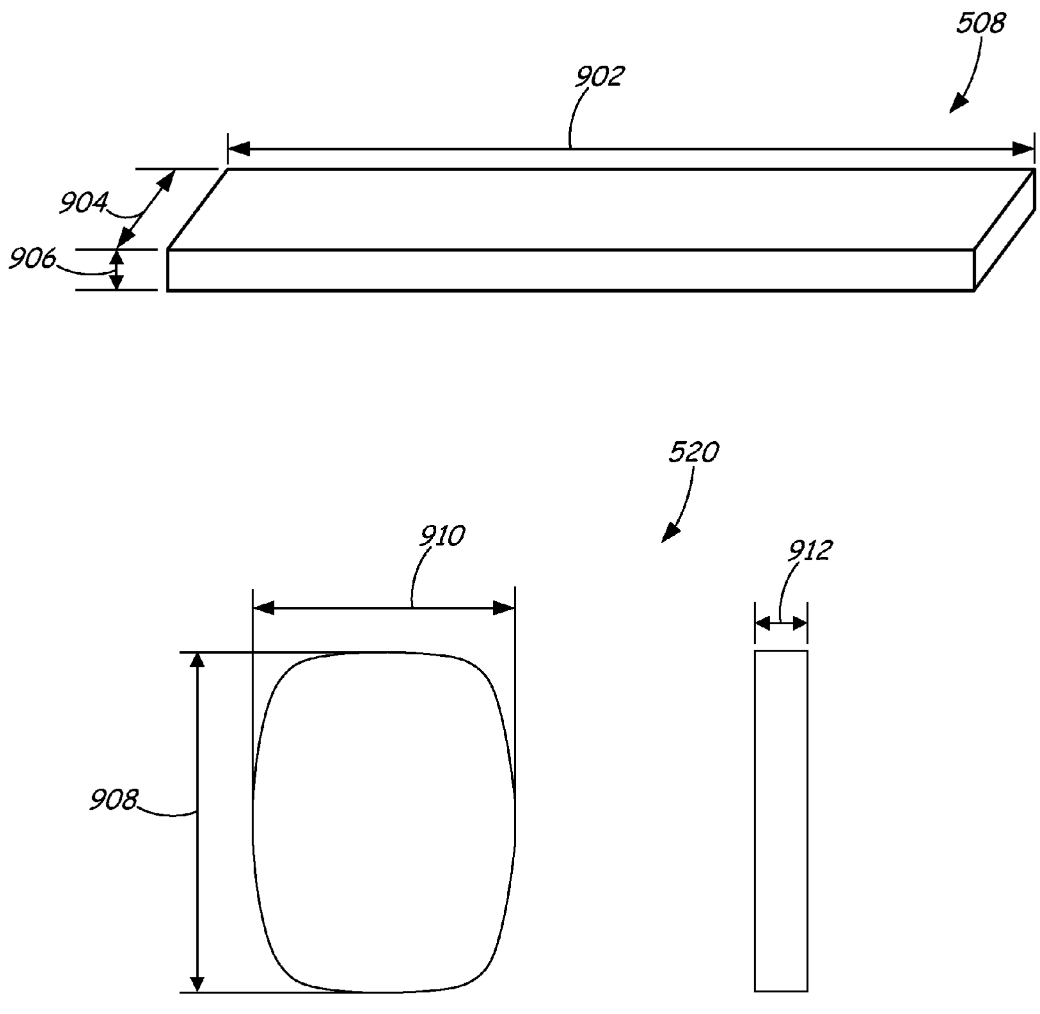


FIG. 9

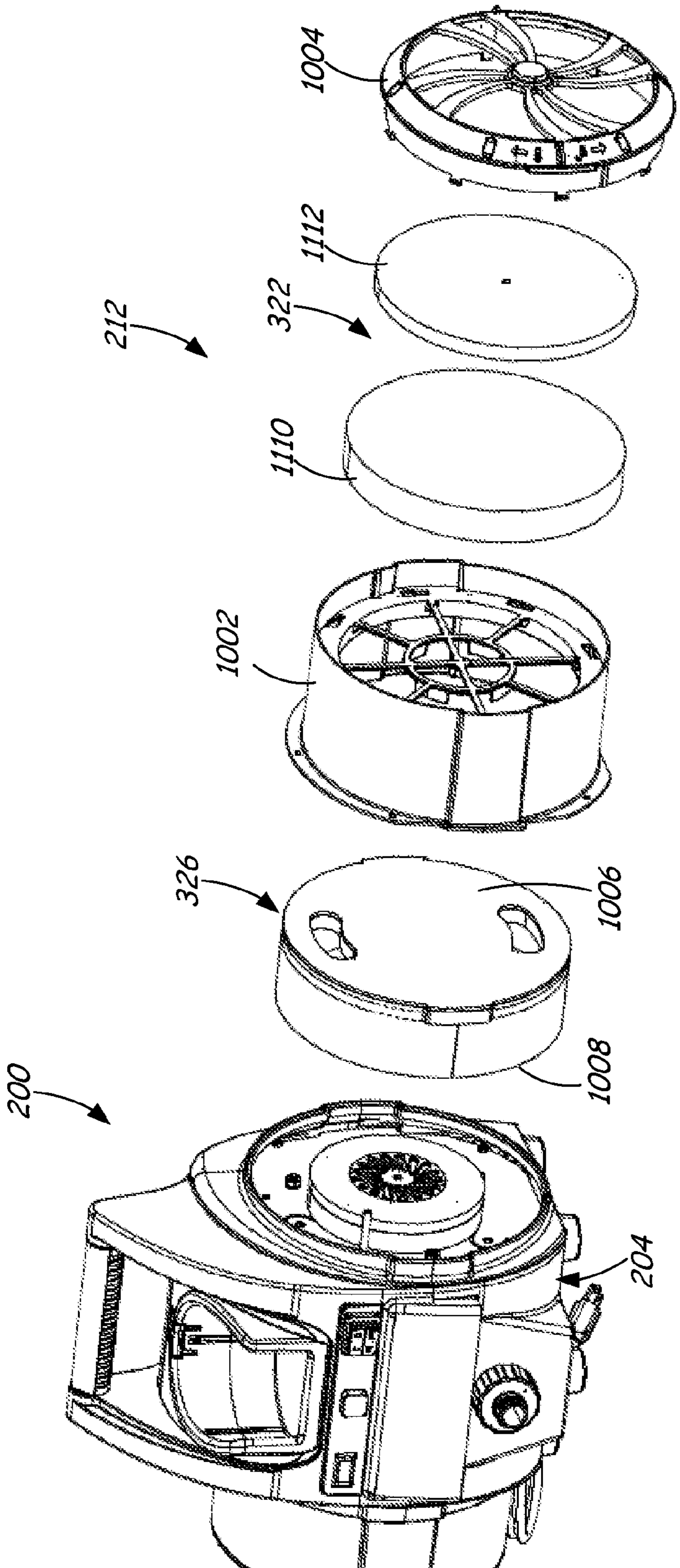


FIG. 10

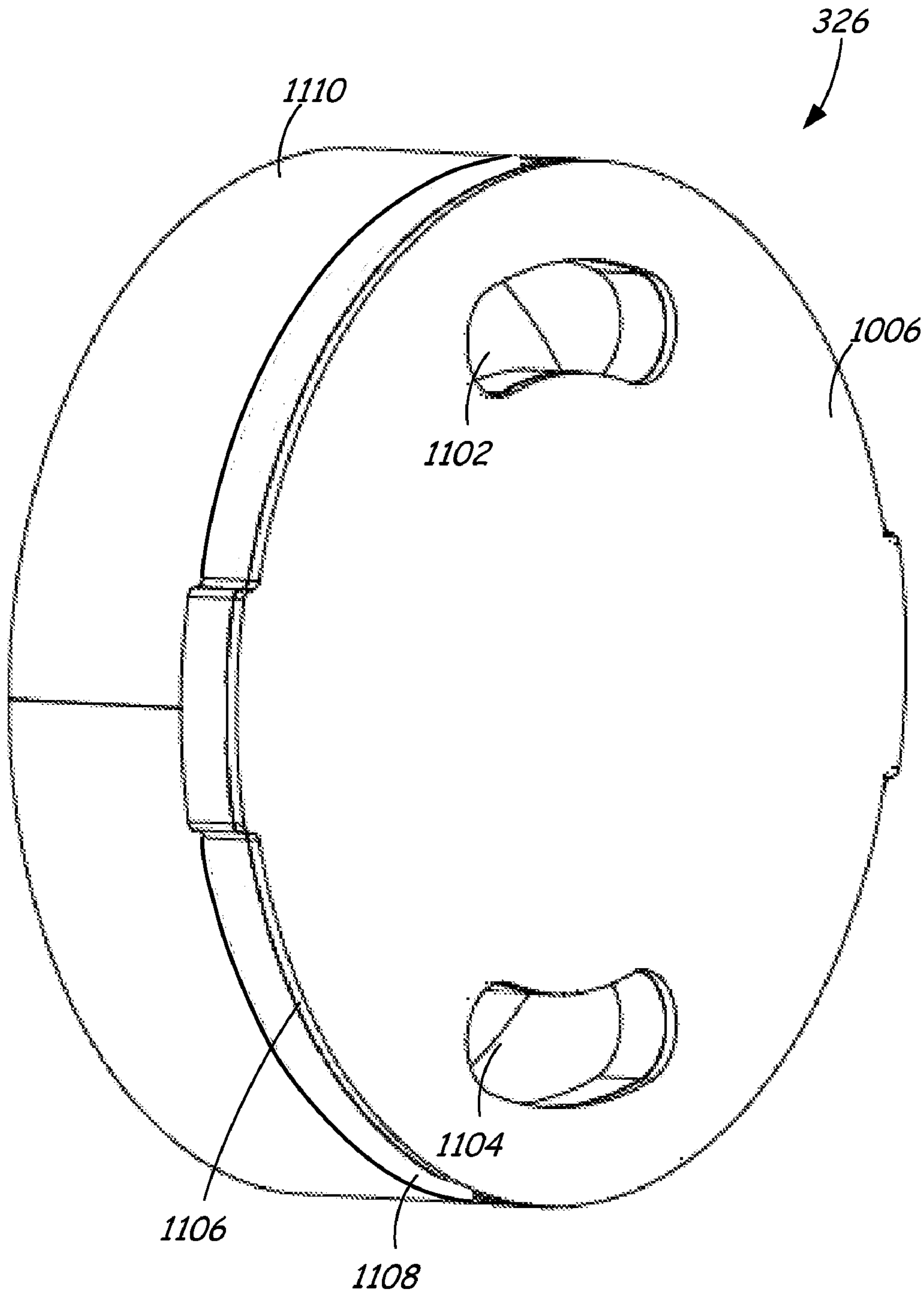


FIG. 11

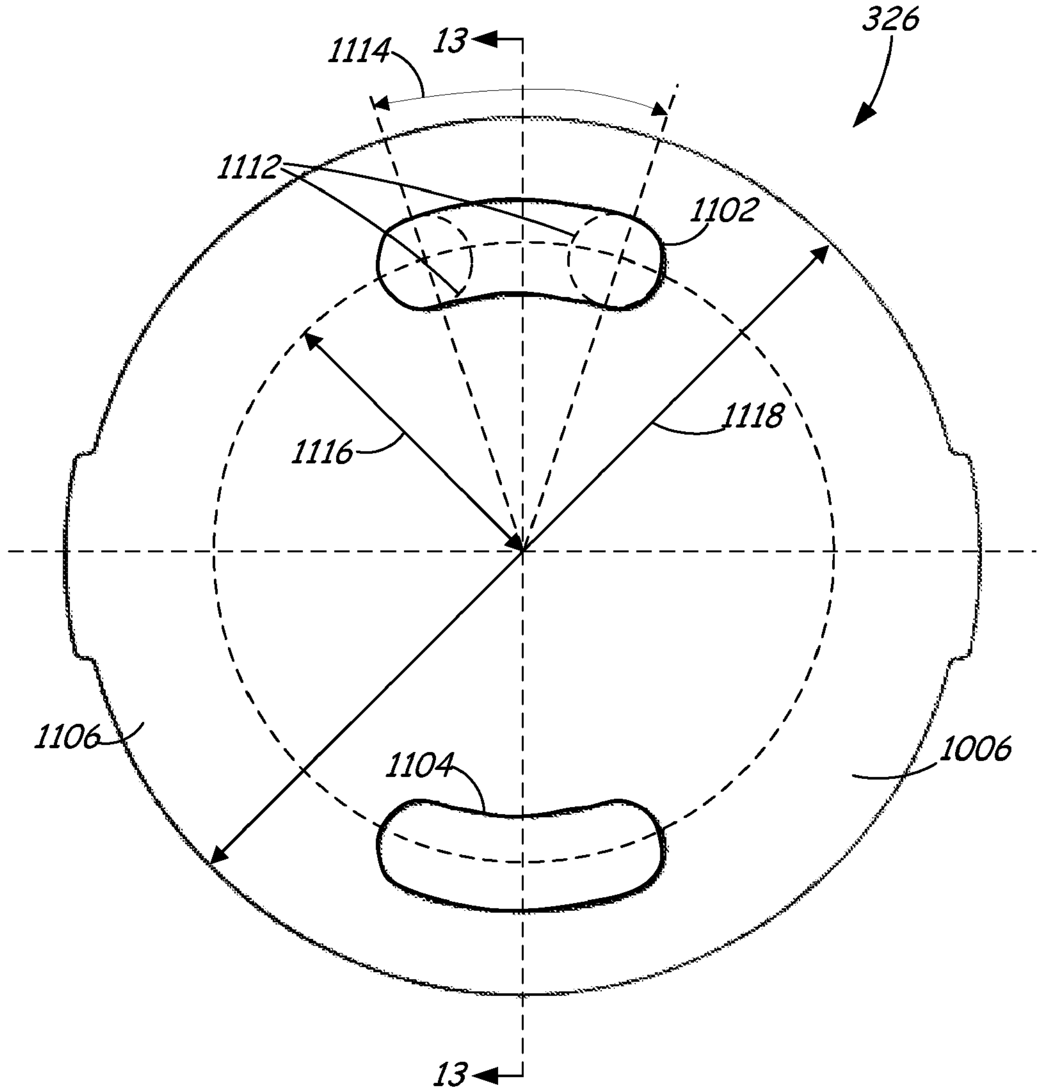


FIG. 12

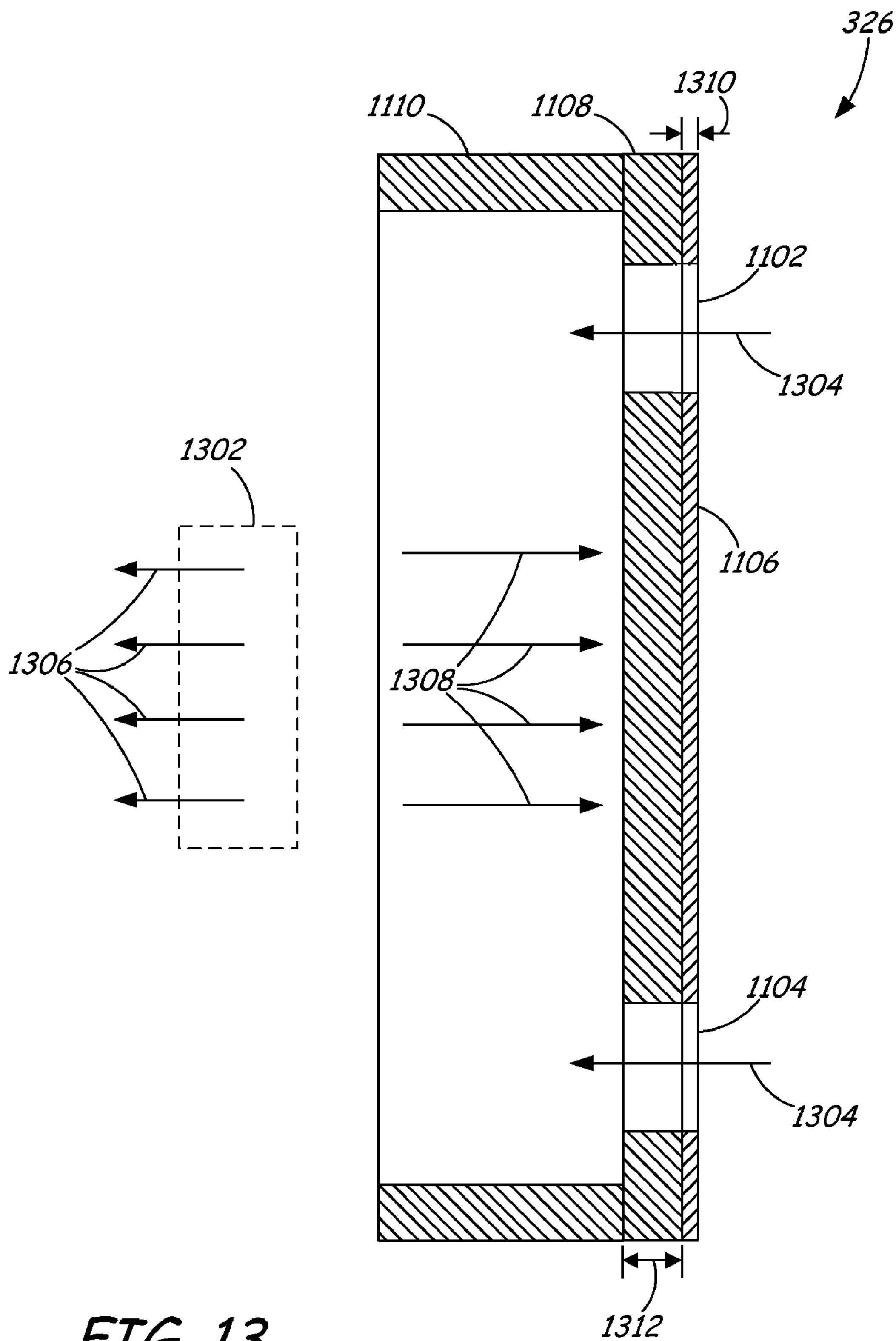

326
1110
1108
1310
1102
1304
1302
1106
1306
1308
1104
1304
1312

FIG. 13

TURBINE WITH IMPROVED SOUND REDUCTION

BACKGROUND

[0001] The present disclosure generally relates to a turbine for a fluid delivery system and more specifically, but not by limitation, to a portable air turbine for a fluid delivery system having improved sound reduction.

[0002] One example of a fluid delivery system comprises a spray-coating system having a device configured to spray a fluid material (e.g., paint, ink, varnish, texture, etc.) through the air onto a surface. Such spray-coating systems often include a fluid material source and, depending on the particular configuration or type of system, a motor for providing pressurized fluid material and/or air to an output nozzle or tip that directs the fluid material in a desired spray pattern. For example, some common types of fluid delivery systems employ compressed gas, such as air compressed by an air compressor or propelled by a turbine, to direct and/or atomize fluid material particles onto a surface. Fluid material is provided from the fluid material source using pressure feed, suction feed, and/or gravity feed mechanisms, for example.

[0003] Air turbines used in fluid delivery systems are often portable and are positioned within a housing having a handle that allows the apparatus to be carried by a user, for example. However, despite retention of the apparatus within the housing, the emitted noise level can make it difficult for a user of the equipment to talk with others and can be audibly uncomfortable for those who work near the equipment for extended periods of time. Further, portable turbines can include weight considerations or constraints as they are frequently moved (i.e., carried by a user) between job sites, for example. Accordingly, a need exists for a quieter turbine having suitable performance and weight characteristics.

[0004] The discussion above is merely provided for general background information and is not intended to be used as an aid in determining the scope of the claimed subject matter.

SUMMARY

[0005] The present disclosure generally relates to a turbine for a fluid delivery system and more specifically, but not by limitation, to a portable turbine for a fluid delivery system having improved sound reduction.

[0006] In one exemplary embodiment, a portable turbine apparatus is provided and includes a motor and a turbine configured to be driven by the motor for providing pressurized air to an outlet. A first inlet airflow path delivers air to the motor. A first silencer component having sound absorptive material is positioned along the first inlet airflow path and includes at least one orifice formed therethrough for the first inlet airflow path, the at least one orifice having a cross-sectional area of at least 0.01 square inches. A second inlet airflow path delivers air to the turbine. A second silencer component having sound absorptive material is positioned along the second inlet airflow path and includes at least one orifice formed therethrough for the second inlet airflow path, the at least one orifice having a cross-sectional area of at least 0.01 square inches.

[0007] In one exemplary embodiment, a portable apparatus is provided and includes a motor and a first inlet airflow path for delivering air to the motor. The apparatus also includes a mechanism driven by the motor for compressing air received from a second inlet airflow path. The compressed air is provided to an outlet of the apparatus. The apparatus also includes a first silencer component positioned along the first inlet airflow path. At least a portion of the first inlet airflow path passes through the first silencer component. The first silencer component comprising a first layer that includes sound absorptive material and a second layer that includes acoustic barrier material. The apparatus also includes a second silencer component positioned along the second inlet airflow path. At least a portion of the second inlet airflow path passes through the second silencer component. The second silencer component comprises a first layer that includes sound absorptive material and a second layer that includes acoustic barrier material.

[0008] In one exemplary embodiment, a portable turbine apparatus is provided and includes a housing, a motor positioned within the housing, and a turbine positioned within the housing and configured to be driven by the motor for providing compressed air to an outlet. The apparatus also includes a first inlet airflow path from a first side of the housing to the motor and a second inlet airflow path from a second, opposite side of the housing to the turbine. A first silencer component having a sound absorbent material is positioned along the first inlet airflow path and a second silencer component having a sound absorbent material is positioned along the second inlet airflow path.

[0009] These and various other features and advantages will be apparent from a reading of the following Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter. The claimed subject matter is not limited to implementations that solve any or all disadvantages noted in the background.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** is a diagram of an exemplary fluid delivery system.

[0011] FIG. **2** is a perspective view of a portable turbine apparatus, under one embodiment.

[0012] FIG. **3** is a cross-sectional view of the portable turbine apparatus illustrated in FIG. **2**.

[0013] FIG. **4** is a partially exploded perspective view of a portable turbine apparatus, under one embodiment.

[0014] FIG. **5** is a perspective view of a silencer component, under one embodiment.

[0015] FIG. **6** is a cross-sectional view of the silencer component illustrated in FIG. **5**.

[0016] FIG. **7** illustrates a backing plate of the silencer component shown in FIG. **6**, under one embodiment.

[0017] FIG. **8** illustrates a sound absorptive panel of the silencer component shown in FIG. **6**, under one embodiment.

[0018] FIG. **9** illustrates a sidewall panel and a baffle panel of the silencer component shown in FIG. **6**, under one embodiment.

[0019] FIG. **10** is a partially exploded perspective view of a portable turbine apparatus, under one embodiment.

[0020] FIG. **11** is a perspective view of a silencer component, under one embodiment.

[0021] FIG. **12** is an end view of the silencer component illustrated in FIG. **11**.

[0022] FIG. **13** is a cross-sectional view of the silencer component illustrated in FIG. **11**.

DETAILED DESCRIPTION

[0023] FIG. **1** is a diagram illustrating an exemplary fluid delivery system **100**. System **100** includes a spray gun **102** configured to spray fluid material from an output **112** when a trigger **110** is actuated (i.e., pulled). Output **112** comprises a nozzle or tip configured to discharge the fluid material in a desired spray pattern. In one embodiment, the fluid material is entrained in an airflow from spray gun **102**. In one particular example, spray gun **102** is configured to atomize the fluid material that is sprayed through the air. Examples of fluid materials include, but are not limited to, primers, inks, paints, varnishes, block fillers, elastomerics, drywall mud, textures, popcorn, and splatter finishes, herbicides, insecticides, and food products, to name a few.

[0024] In the illustrated embodiment, fluid delivery system **100** comprises an air-driven system that employs pressurized air provided from an air source (e.g., air compressed by an air compressor or a turbine) to propel material from output **112**. A fluid material source **104** is configured to provide fluid material to spray gun **102**. Fluid material is provided from the fluid material source **104** using pressure feed, suction feed, and/or gravity feed mechanisms, for example. Material source **104** can be mounted to spray gun **102** (e.g., an onboard hopper or container) and/or can be remote from (e.g., not mounted to) spray gun **102**. One example of a fluid material container that can be utilized with spray gun **102** is illustrated in commonly assigned U.S. Pat. No. 5,655,714, the content of which is hereby incorporated by reference in its entirety.

[0025] Air source **106** is configured to provide air to spray gun **102** that is used to atomize and propel the fluid material provided from fluid material source **104**. In the embodiment illustrated in FIG. **1**, air source **106** comprises a portable air turbine apparatus that provides pressurized air to spray gun **102** through a tube **107**.

[0026] FIG. **2** is a perspective view of one embodiment of a portable air turbine assembly **200** for use in a fluid delivery system, such as system **100** illustrated in FIG. **1**. Turbine assembly **200** includes a handle **202** connected to a turbine housing **204**. Turbine housing **204** houses a motor configured to drive a turbine that provides a source of pressurized air to an air outlet **206**. It is noted that turbine assembly **200** can include multiple motors and/or multiple turbines. In one embodiment, air outlet **206** is connected via an air hose (not shown) to a hand-held paint spray gun, such as an HVLP type spray gun, which uses air to atomize paint.

[0027] Turbine assembly **200** includes a first air intake assembly **208** at a first end **210** of turbine housing **204** and a second air intake assembly **212** at a second, opposite end **214** of housing **204**. Air intake assembly **208** provides a first inlet airflow path that delivers air to be compressed by the turbine in housing **204**. Air intake assembly **212** provides a second inlet airflow path that delivers air for cooling the motor in housing **204**.

[0028] FIG. **3** is a cross-sectional view of turbine assembly **200** taken at line **3-3** illustrated in FIG. **2**. As shown, the first inlet airflow path (generally illustrated by arrow **308**) provided from air intake assembly **208** is provided to an input **311** of turbine **310**. Turbine **310** compresses the air, which is then delivered to air outlet **206** (illustrated in FIG. **2**). The second inlet airflow path (generally illustrated by arrow **312**) provided from air intake assembly **212** is provided to an input **315** of motor **314** to aid in cooling motor **314**.

[0029] A first air filter assembly **320** is provided in the first inlet airflow path between end **210** and turbine **310**. A second air filter assembly **322** is provided in the second inlet airflow path between end **214** and motor **314**.

[0030] In accordance with one embodiment, turbine assembly **200** includes a first silencer component **324** positioned along the first inlet airflow path and a second silencer component **326** positioned along the second inlet airflow path. Silencer components **324** and **326** are configured to allow the inlet airflows **308** and **312** while providing sound attenuation qualities. In one embodiment, silencer component **324** is positioned between filter **320** and turbine **310** and silencer component **326** is positioned between air filter **322** and motor **314**.

[0031] FIG. **4** is a perspective view of turbine assembly **200**, illustrating air intake assembly **208** in exploded view. Intake assembly **208** includes an intake assembly housing **402** that is mounted to turbine housing **204**, for example using fasteners such as screws and/or bolts. An air filter assembly **320** is positioned between an intake assembly cap **404** and intake assembly housing **402**. Air filter assembly **320** illustratively comprises a two-stage filter having a main filter **408** and a pre-filter **412**. Pre-filter **412** comprises a foam or foam-like material, for example, and is configured to filter large particles in the inlet airflow, prior to the airflow passing through main filter **408**.

[0032] In one example, pre-filter **412** is easily removable for cleaning and/or replacement, as desired. Main filter **408** is retained in a filter frame **410** and comprises a pleated material (such as paper or paper-like materials), for example. Main filter **408** has finer filtration capabilities as compared to pre-filter **412** and operates to keep some or all particles out of the atomizing air provided by the turbine. In one embodiment, filter frame **410** is retained within a portion of intake assembly housing **402** and can comprise a seal (not shown in FIG. **4**), such as an o-ring and the like, positioned between the filter frame **410** and housing **402**.

[0033] Silencer component **324** is positioned between intake assembly housing **402** and turbine housing **204**. A first side **404** of silencer component **324** faces air filter assembly **320** and a second side **406** of silencer component **324** faces turbine housing **204**.

[0034] FIG. **5** is a perspective view of silencer component **324** taken from side **406**. FIG. **6** is a cross-sectional view of silencer component **324** taken at line **6-6**, illustrated in FIG. **5**. As shown, silencer component **324** comprises a multi-layered structure and includes at least one aperture formed therethrough. In one embodiment, the at least one aperture has a cross-sectional area of at least 0.01 square inches. A first layer **502** and a second layer **504** are substantially planar and form an inlet orifice **506**. Silencer component **324** also includes a sidewall **508** that forms an outlet **510**. Arrow **512** generally illustrates the flow of air through silencer component **324** between the inlet **506** and the outlet **510**. In one embodiment, the airflow from silencer component **324** enters the turbine input (i.e., input **311** illustrated in FIG. **11**), which is generally illustrated by dashed box **514**. The airflow into the input of the turbine is generally illustrated by arrows **516**.

[0035] Silencer component **324** operates to significantly reduce the amount of sound emanating from the turbine side (i.e., side **210**) of assembly **200** without an appreciable change in the airflow through intake assembly **208** into the turbine. In one embodiment, at least one layer of silencer component **324** comprises sound absorptive material(s) (also referred to as acoustical insulation) configured to absorb the sound (generally illustrated by arrows **518**) emanating from the input of the turbine (generally illustrated by dashed box **514**), for example. For instance, layer **504** (which is substantially planar) and/or sidewall **508** can be made of foam or foam-like material, such as, but not limited to, low-density polyester-based open cell urethane foam and the like. In one embodiment, layer **504** and/or sidewall **508** are made of material having a density of approximately two pounds per cubic foot (lbs/ft^3).

[0036] In one embodiment, at least one layer of silencer component **324** comprises an acoustic barrier material. The acoustic barrier material has lower sound absorption qualities (as compared to the sound absorptive material used for layer **504** and/or sidewall **508**, for example) and is configured to provide sound barrier and vibration dampening qualities. For example, in one embodiment silencer component **324** comprises a layer **502** (that is substantially planar) that is configured to absorb and/or deflect at least a portion of the sound that passes through layer **504**. Layer **502** is also referred to as a backing plate to which layer **504** is adhered. In one embodiment, layer **502** comprises an acoustic barrier material such as, but not limited to, extruded elastomeric materials and the like. For example, the acoustic barrier layer can comprise poly-vinyl-chloride (PVC)/vinyl. In one embodiment, layer **502** is formed of a material having a density of approximately one pound per square foot (lb/ft^2).

[0037] Silencer component **324** can also include a baffle layer **520** that is attached to layer **504** and allows the airflow **512** to flow through silencer component **324** while operating to absorb sound that would otherwise emanate through inlet **506**. Baffle layer **502** can be formed of the same, or substantially similar, material as layer **504**.

[0038] FIG. **7** illustrates backing plate **502**. Backing plate **502** has an outer diameter **702** and at least one orifice **704** formed therethrough. In one embodiment, outer diameter **702** is approximately 9.25 inches and orifice **704** is centered at a radius **706** from the center of plate **502**. In one embodiment, radius **706** is approximately 3.25 inches.

[0039] In one example, orifice **704** is formed by two circular apertures **708** spaces apart at an angle **710**. In one embodiment, the circular aperture **708** each have a diameter of approximately 1 inch and angle **710** comprises an angle of approximately 22 degrees. In one embodiment, plate **502** has a thickness **522** (illustrated in FIG. **6**) of approximately 0.1 to 0.2 inches.

[0040] FIG. **8** illustrates sound absorptive layer **504**. An orifice **802** is formed in layer **504** and has a height **804** and a width **806**. In one embodiment, height **804** is approximately 3.25 inches and width **806** is approximately 2.5 inches. A bottom **808** of orifice **802** is spaced a distance **810** from the center **812** of panel **504**. In one embodiment, distance **810** is approximately 0.5 inches. In one embodiment, panel **504** has a thickness **524** (illustrated in FIG. **6**) of approximately 0.5 inches.

[0041] FIG. **9** illustrates sidewall **508** and baffle **520**. Sidewall **508** is illustrated in an "unrolled" state. In one embodiment, sidewall **508** is formed of a material that is the same, or substantially similar, to panel **504**. Sidewall **508** has a length **902**, a width **904**, and a thickness **906**. In one embodiment, length **902** is approximately 26.9 inches, width **904** is approximately 2.4 inches and thickness **906** is approximately 0.5 inches.

[0042] In one embodiment, baffle **520** is formed of material that is removed from panel **504** to form orifice **802**. In this embodiment, baffle **520** has a height **908**, width **910**, and thickness **912** that is substantially similar to height **804**, width **806** and thickness **524**, respectively, illustrated in FIG. **6** and FIG. **8**.

[0043] Referring to FIG. **6**, in one embodiment the height **526** of the orifice formed in panel **502** is substantially similar to the gap **528** formed between the bottom surface **530** of baffle **520** and the bottom surface **532** of the orifice formed in panel **504**.

[0044] FIG. **10** is a perspective view of turbine assembly **200** illustrating air intake assembly **212** in exploded view. As shown, air filter assembly **322** is positioned between an intake assembly housing **1002** and an intake assembly cap **1004**. In one embodiment, air filter assembly **322** comprises a two-stage filter including a main filter **1110** and a pre-filter **1112**. In one example, pre-filter **1112** comprises a foam or foam-like and can be similar to pre-filter **412** illustrated in FIG. **4**. Pre-filter **1112** is configured to filter large particles in the inlet airflow, prior to the airflow passing through main filter **1110**. In one example, pre-filter **1012** is easily removable for cleaning and/or replacement, as desired.

[0045] In one embodiment, filter **1110** is substantially similar to filter **408**, illustrated in FIG. **4**. In one embodiment, filter **1110** is different than filter **408** and can comprise a foam or foam-like material, for example. In one example, filter **1110** is configured to allow a greater airflow rate therethrough and/or lesser particle filtration as compared to filter **408**. In this manner, the airflow rate into the motor side of assembly **200** can be greater than the airflow rate into the turbine side of assembly **200**.

[0046] The second silencer component **326** is positioned between the intake assembly housing **1002** and the turbine housing **204**. Intake assembly housing **1002** can be attached to turbine housing **204**, for example using fasteners such as screws and/or bolts. A first side **1006** of silencer component **326** faces air filter assembly **322** and a second side **1008** of silencer component **326** faces turbine housing **204**.

[0047] FIG. **11** is a perspective view of silencer component **326**. As shown, silencer component **326** comprises a multi-layered structure that includes at least one aperture formed therethrough. In one embodiment, the at least one aperture has a cross-sectional area of at least 0.01 square inches. A first layer **1106** and a second layer **1108** are substantially planar and include first and second apertures **1102** and **1104** formed therethrough. FIG. **12** is an end view of silencer component **326** taken from side **1006**. FIG. **13** is a cross-sectional view of silencer component **326** taken from line **13-13** illustrated in FIG. **12**.

[0048] Silencer component **326** includes at least one layer of sound absorptive material. In the illustrated embodiment, layer **1108** comprises a layer of sound absorptive material that is adhered to a backing layer **1106**. In one embodiment, layer **1108** is formed of a material that is the same as, or substantially similar to, layer **504** (illustrated in FIGS. **5** and **6**) and layer **1106** is formed of a material that is the same as, or substantially similar to, layer **502** (illustrated in FIGS. **5** and **6**). Component **326** also includes a sidewall **1110**. In one embodiment, sidewall **1110** is substantially similar to sidewall **508** (illustrated in FIGS. **5** and **6**).

[0049] Referring to FIG. **12**, orifice **1102** is formed by two circular apertures **1112** spaced apart at an angle **1114** along a radius **1116**. In one embodiment, radius **1116** is approximately 3.25 inches and circular apertures **1112** have a diameter of approximately 1 inch. In one embodiment, the angle **1114** is approximately 36 degrees and the overall diameter

1118 of component **326** is approximately 9.25 inches. In one embodiment, aperture **1104** is substantially similar to and a mirror image of, aperture **1102**.

[0050] Referring to FIG. **13**, silencer component **326** operates to significantly reduce the amount of sound emanating from the motor side (i.e., side **214**) of assembly **200** without an appreciable change in the airflow through intake assembly **212** into the motor. As illustrated, sound (generally illustrated by arrows **1308**) emanating from the input of motor **314** (generally illustrated in FIG. **13** by box **1302**) is absorbed by silencer component **326**. The airflow (generally illustrated by arrows **1304**) enters silencer component **326** through orifices **1102** and **1104**. The airflow (generally illustrated by arrows **1306**) then enters the motor input (generally illustrated by block **1302**). As shown, an offset exists between the silencer input orifices (i.e., orifices **1102** and **1104**) and the motor input (i.e., box **1302**), which acts as a baffle to reduce the sound emanating from the turbine assembly through the intake assembly **212**.

[0051] In one embodiment, thickness **1310** of layer **1106** is substantially similar to thickness **522** of layer **502** and thickness **1312** of layer **1108** is substantially similar to thickness **524** of layer **504**. Further, in one embodiment sidewall **1110** is substantially similar to sidewall **508**.

[0052] As mentioned above, in one example turbine assembly **200** is portable (e.g., turbine assembly **200** is carried by a user between job sites). In accordance with one embodiment, silencer components **324** and **326** are designed to be lightweight (e.g., components **324** and **326** do not significantly add to the overall weight of turbine assembly **200**, components **324** and **326** comprise a small percentage of the overall weight of assembly **200**, etc.), while providing improved sound attention qualities that significantly reduce the overall noise emanating from turbine assembly **200**. For example, in one embodiment the combined weight of components **324** and **326** is less than approximately 1.25 pounds (lbs). In one embodiment, the combined weight of components **324** and **326** is approximately 1 pound (lb). In one particular example, components **324** and **326** have a weight of approximately 0.53 and 0.5 lbs., respectively.

[0053] In one particular embodiment, turbine assembly **200** comprises a 5-stage turbine having an overall weight of approximately 22 lbs. Silencer components **324** and **326** comprise approximately 1.03 lbs, which is approximately 4.7 percent of the overall weight of turbine assembly **200**.

[0054] It is noted that these are examples of particular illustrative embodiments of turbine assembly **200** and silencer components **324** and **326**, and are not meant to limit the scope of the concepts described herein.

[0055] While various embodiments of the invention have been set forth in the foregoing description, together with details of the structure and function of various embodiments of the disclosure, this disclosure is illustrative only, and changes may be made in detail, especially in matters of structure and arrangement of parts within the principles of the present disclosure to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed. For example, the particular elements may vary depending on the particular application for the system or method while maintaining substantially the same functionality without departing from the scope and spirit of the present disclosure and/or the appended claims.

What is claimed:

1. A portable turbine apparatus comprising:

a motor;

a turbine configured to be driven by the motor for providing pressurized air to an outlet;

a first inlet airflow path for delivering air to the motor, wherein a first silencer component having sound absorptive material is positioned along the first inlet airflow path and includes at least one orifice formed therethrough for the first inlet airflow path, the at least one orifice having a cross-sectional area of at least 0.01 square inches; and

a second inlet airflow path for delivering air to the turbine, wherein a second silencer component having sound absorptive material is positioned along the second inlet airflow path and includes at least one orifice formed therethrough for the second inlet airflow path, the at least one orifice having a cross-sectional area of at least 0.01 square inches.

2. The portable turbine apparatus of claim **1**, and further comprising:

an air filter positioned in the first inlet airflow and spaced apart from the first silencer component.

3. The portable turbine apparatus of claim **2**, wherein the first silencer component is positioned between the air filter and the motor.

4. The portable turbine apparatus of claim **1**, and further comprising:

an air filter positioned in the second inlet airflow and spaced apart from the second silencer component.

5. The portable turbine apparatus of claim **4**, wherein the second silencer component is positioned between the air filter and the turbine.

6. The portable turbine apparatus of claim **1**, wherein the first silencer component comprises a multi-layered structure that includes at least first and second layers that are substantially planar.

7. The portable turbine apparatus of claim **6**, wherein the first silencer component comprises a first orifice formed through the first and second layers and a second orifice formed through the first and second layers, wherein the first and second orifices are spaced equidistant from a center of the multi-layered structure.

8. The portable turbine apparatus of claim **1**, wherein the second silencer component comprises a multi-layered structure that includes at least first and second layers that are substantially planar, wherein the at least one orifice is formed through both the first and second layers.

9. The portable turbine apparatus of claim **8**, and further comprising a baffle positioned over at least a portion of the at least one orifice formed through the second silencer component.

10. A portable apparatus comprising:

a motor;

a first inlet airflow path for delivering air to the motor;

a mechanism driven by the motor for compressing air received from a second inlet airflow path, wherein the compressed air is provided to an outlet of the apparatus;

a first silencer component positioned along the first inlet airflow path, wherein at least a portion of the first inlet airflow path passes through the first silencer component, the first silencer component comprising a first layer that includes sound absorptive material and a second layer that includes acoustic barrier material; and

a second silencer component positioned along the second inlet airflow path, wherein at least a portion of the second inlet airflow path passes through the second silencer component, the second silencer component comprising a first layer that includes sound absorptive material and a second layer that includes acoustic barrier material.

11. The portable apparatus of claim **10**, wherein the mechanism comprises an air turbine, the air turbine and motor being enclosed by a turbine housing of the apparatus.

12. The portable apparatus of claim **10**, wherein the first inlet airflow enters a first side of the turbine housing and the second inlet airflow enters a second, opposite side of the turbine housing.

13. The portable apparatus of claim **10**, wherein the first silencer component is positioned within a first inlet housing that is removably coupled to the turbine housing.

14. The portable apparatus of claim **13**, wherein the second silencer component is positioned within a second inlet housing that is removably coupled to the turbine housing.

15. The portable apparatus of claim **14**, wherein each of the first and second silencer components comprise multi-layered structures having at least one sound absorptive material layer attached to a backing layer comprising the acoustic barrier material.

16. A portable turbine apparatus comprising:

a housing;

a motor positioned within the housing;

a turbine positioned within the housing and configured to be driven by the motor for providing compressed air to an outlet;

a first inlet airflow path from a first side of the housing to the motor and a second inlet airflow path from a second, opposite side of the housing to the turbine;

a first silencer component having a sound absorbent material positioned along the first inlet airflow path; and

a second silencer component having a sound absorbent material positioned along the second inlet airflow path.

17. The portable apparatus of claim **16**, wherein the first silencer component comprises a multi-layered structure that includes at least first and second layers that are substantially planar.

18. The portable apparatus of claim **16**, wherein the first silencer component comprises a first orifice formed through the first and second layers and a second orifice formed through the first and second layers, wherein the first and second orifices are spaced equidistant from a center of the multi-layered structure.

19. The portable apparatus of claim **16**, wherein the second silencer component comprises a multi-layered structure that includes at least first and second layers that are substantially planar, wherein the at least one orifice is formed through both the first and second layers.

20. The portable apparatus of claim **16**, and further comprising a baffle positioned over at least a portion of the at least one orifice formed through the second silencer component.

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