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(54) **SUPPRESSOR FOR A FIREARM**

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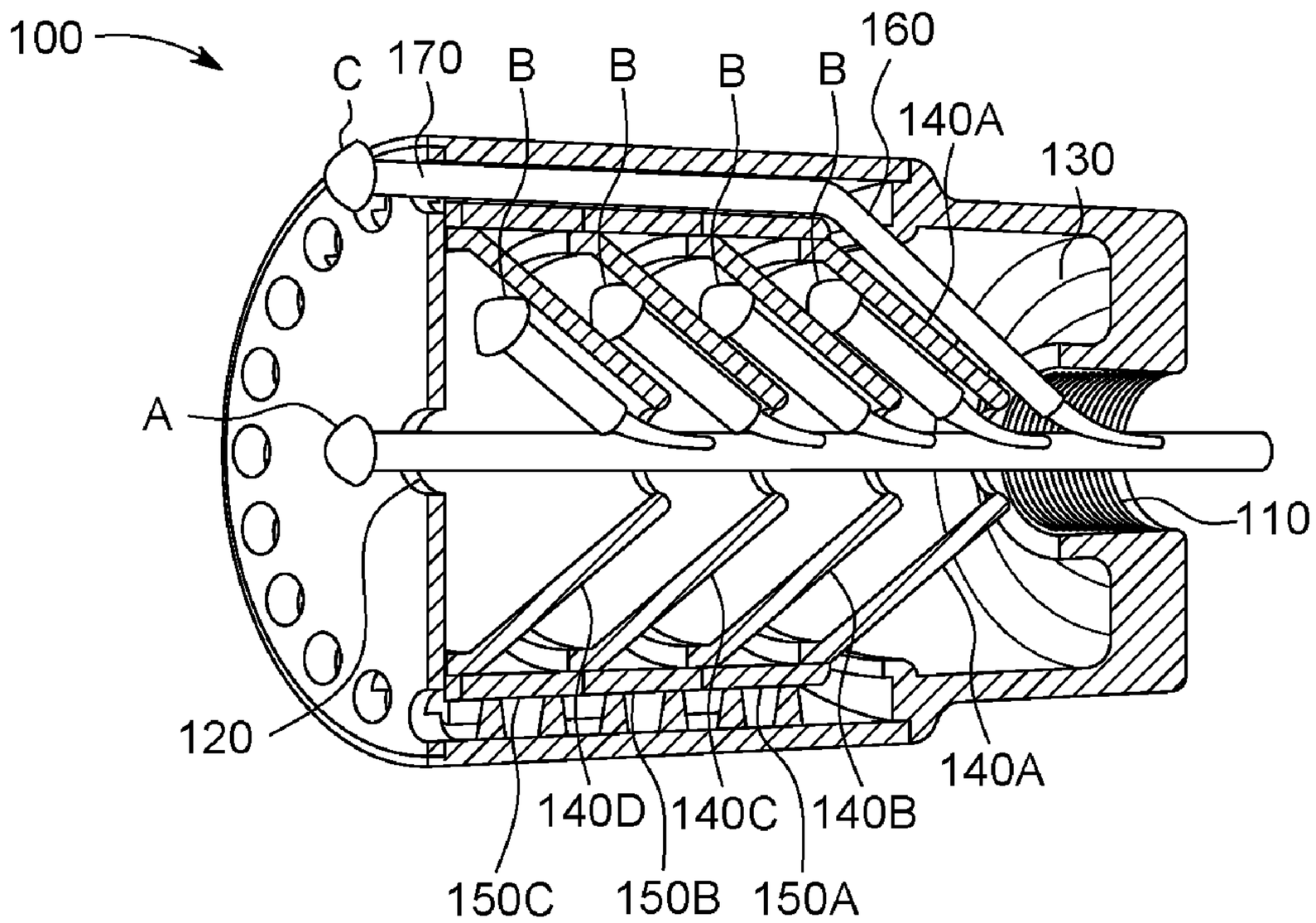
CPC ***F41A 21/30*** (2013.01)

(57) **ABSTRACT**

A device for use in a firearm suppressor or silencer wherein the device directs the high-pressure gas away from the center of the suppressor or silencer. A preferred embodiment of the device is a baffle with a hollow tubular body of cylindrical cross section casing narrowing to a cone shape having sides that define an inlet and outlet end with an interior and exterior surface. The casing has a plurality of apertures and an exterior flow passage or channel extending around the apertures on the exterior surface of the casing. The apertures and flow passages or channels are configured to turn the gas passing through the baffle from a first direction in which the gas exits towards the center of the baffle to a second direction in which the gas exits the baffle away from the center of the baffle.



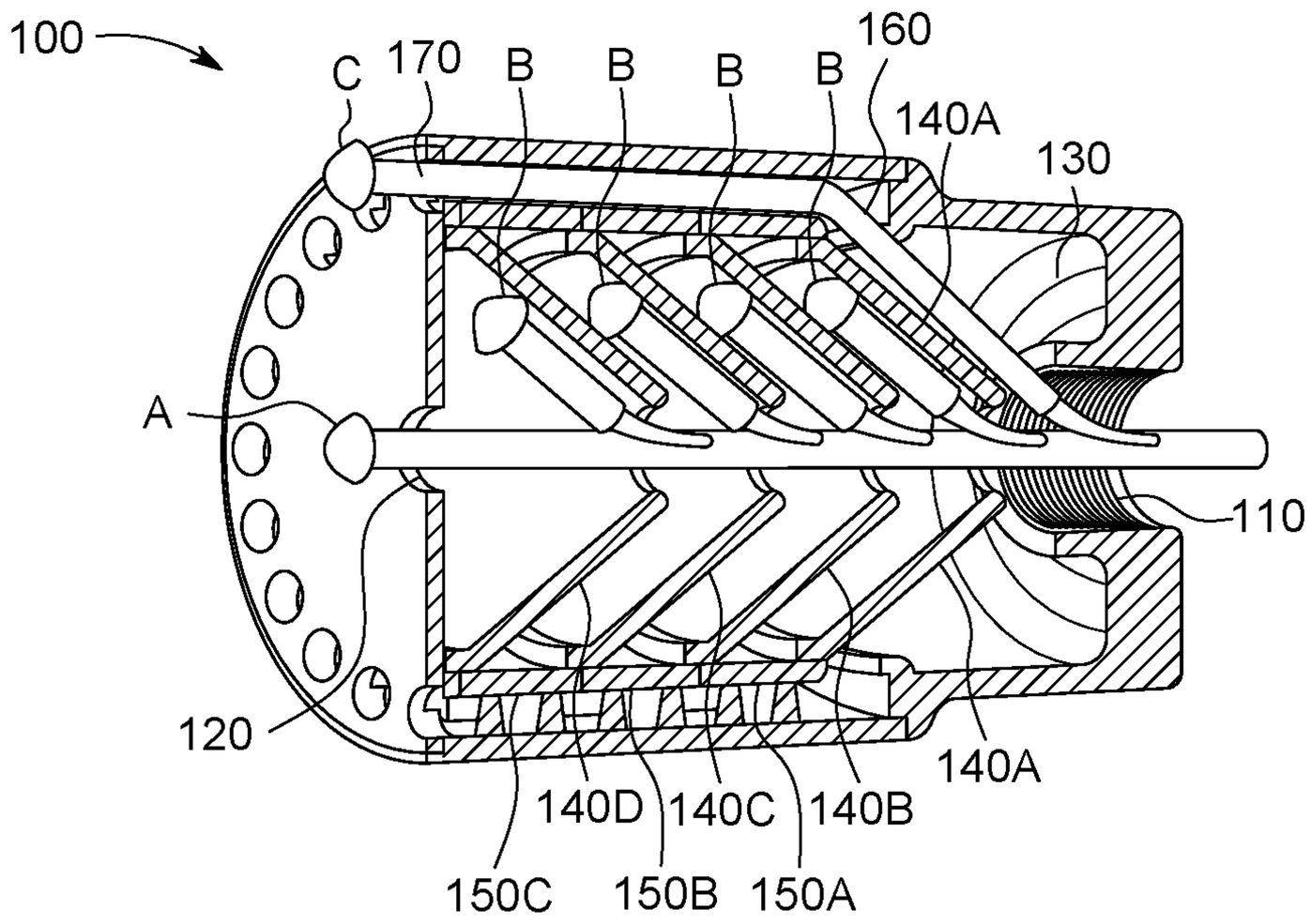

100
C
170
B
B
B
B
160
140A
130
A
110
120
140A
140D
140C
140B
150C
150B
150A

FIG. 1

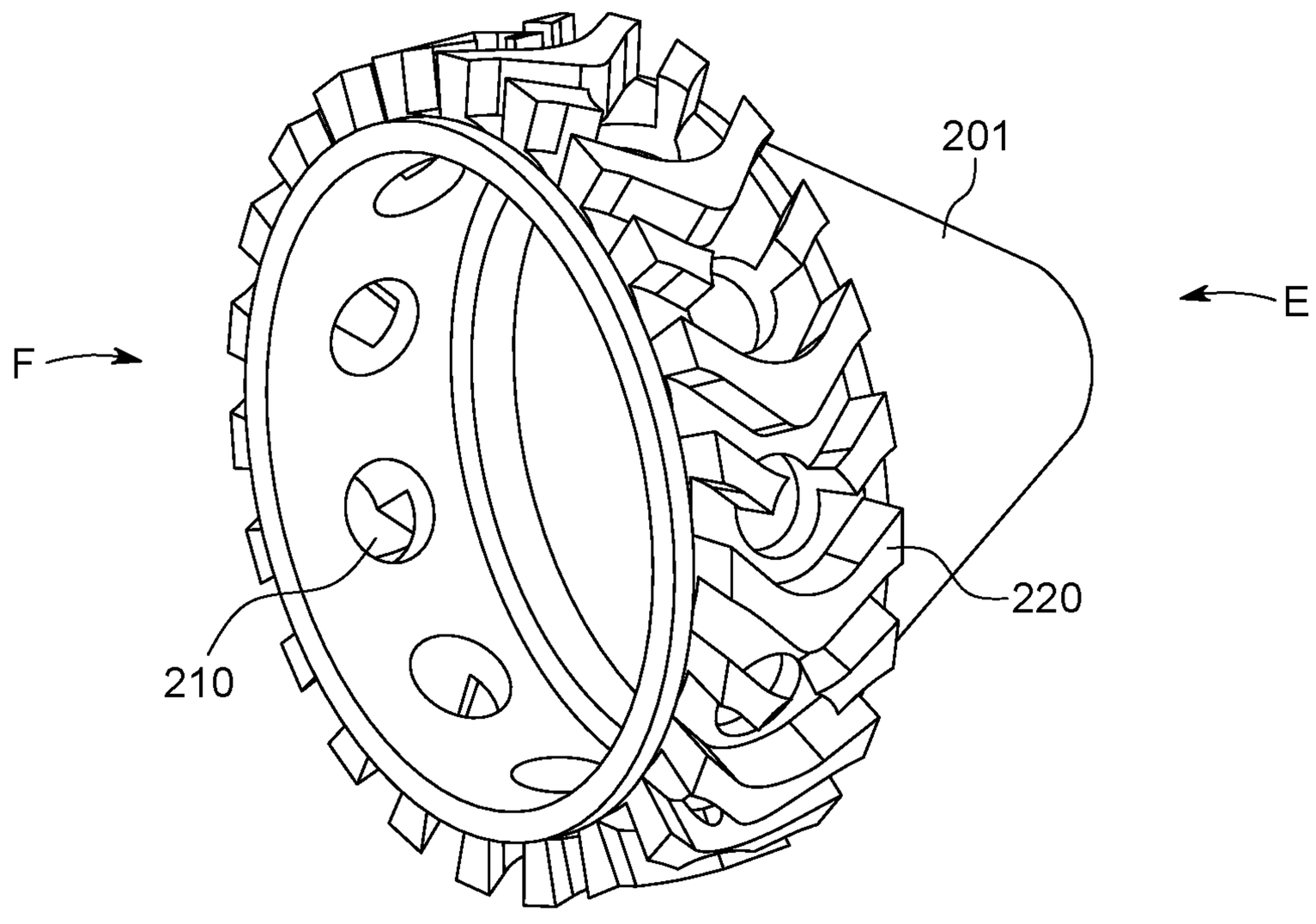

201
E
F
210
220

FIG. 2

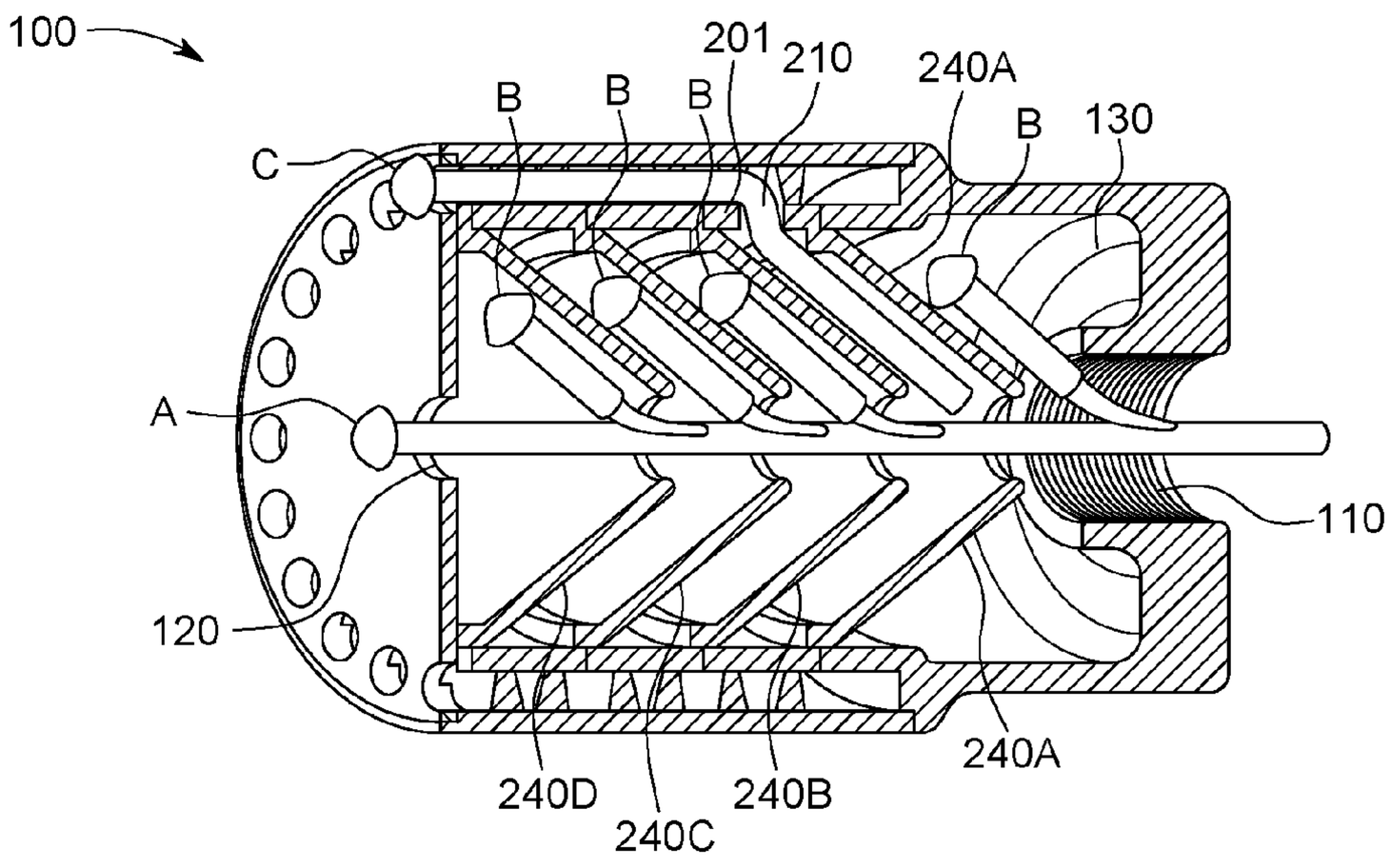


FIG. 3

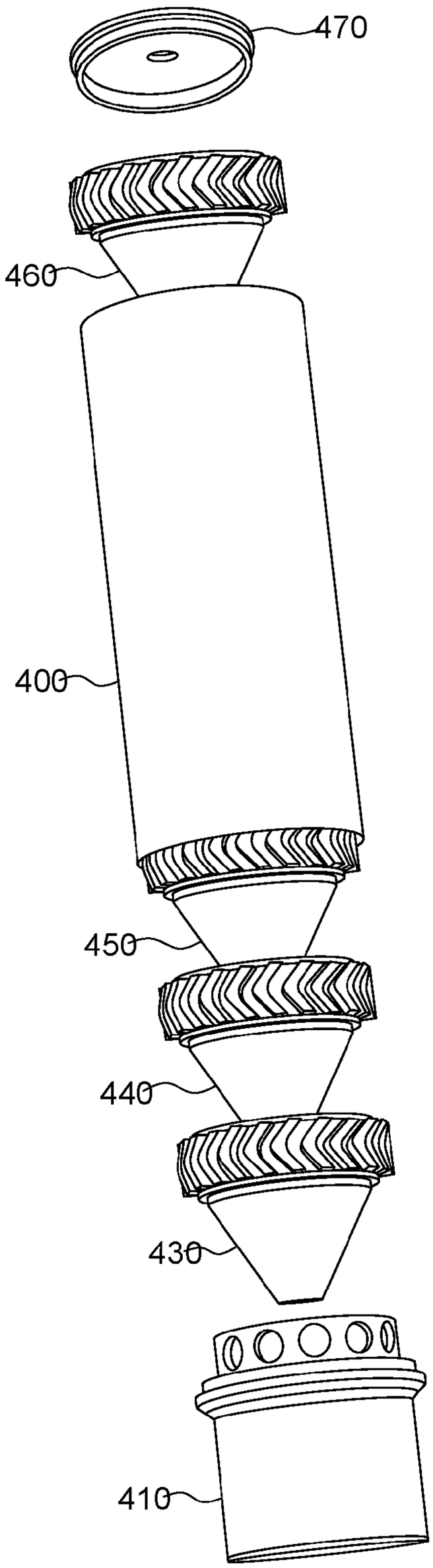


FIG. 4

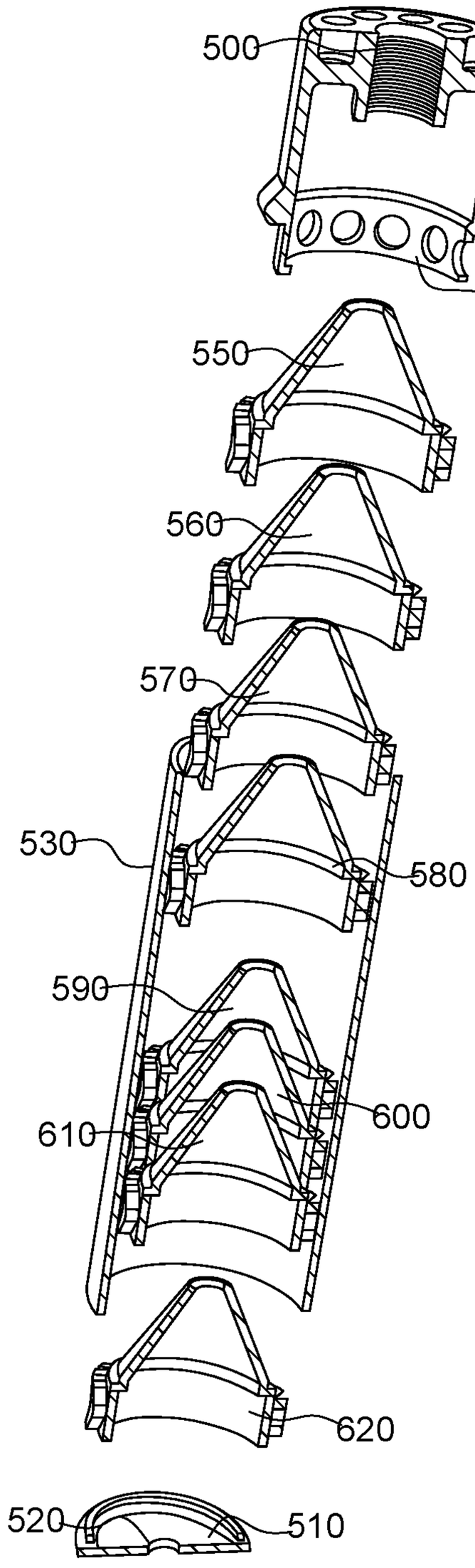


FIG. 5

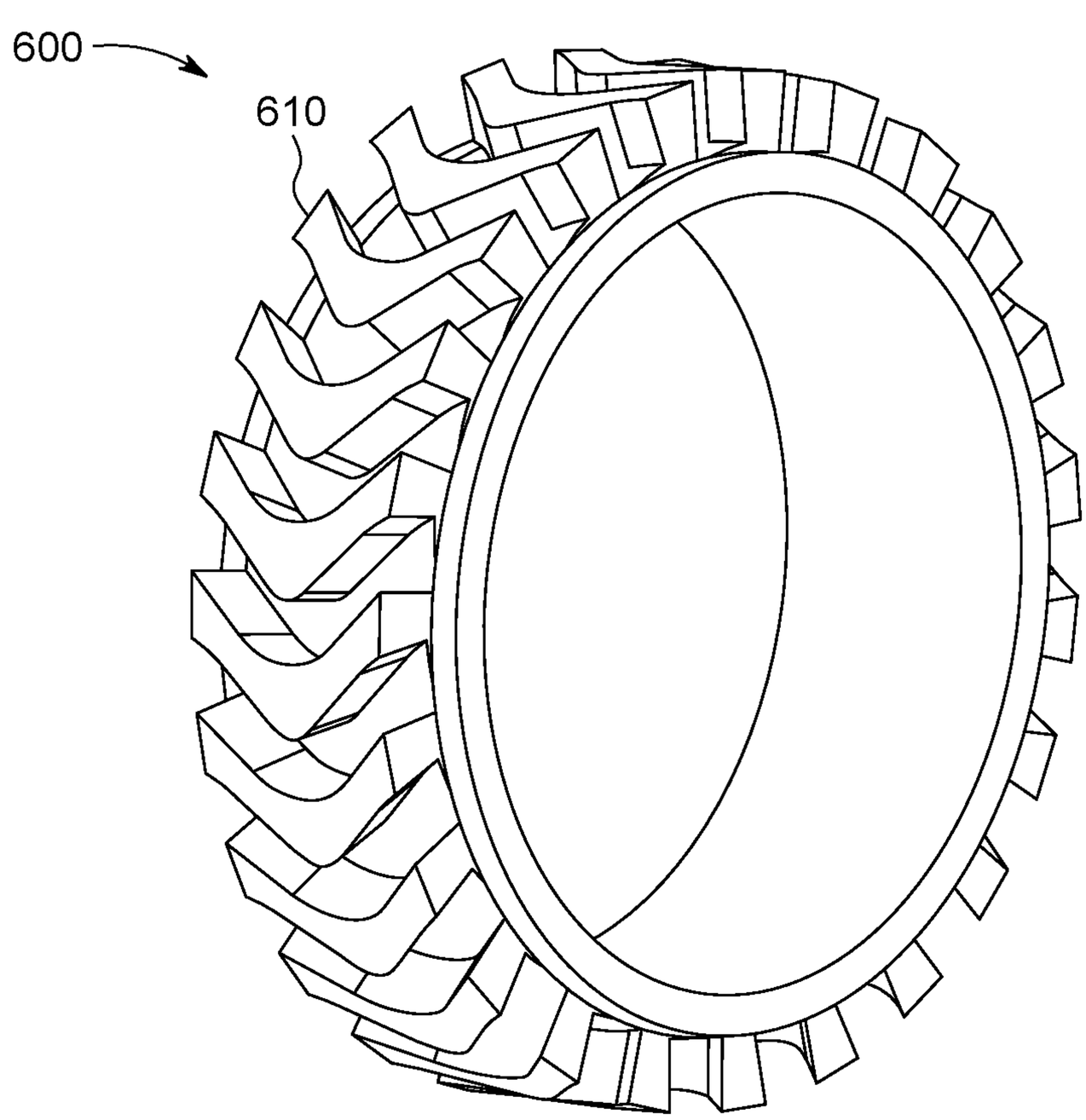


FIG. 6

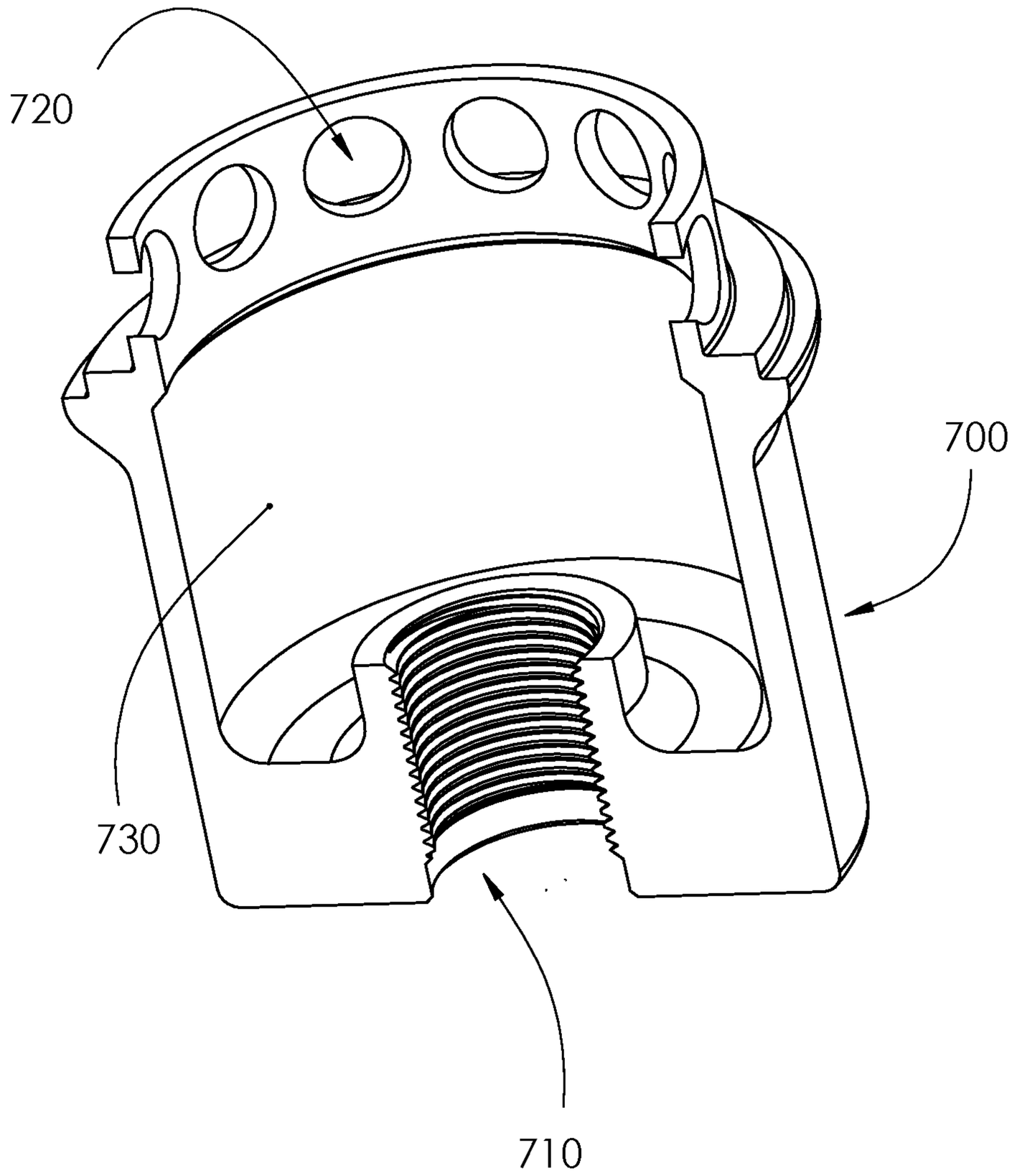


FIG. 7

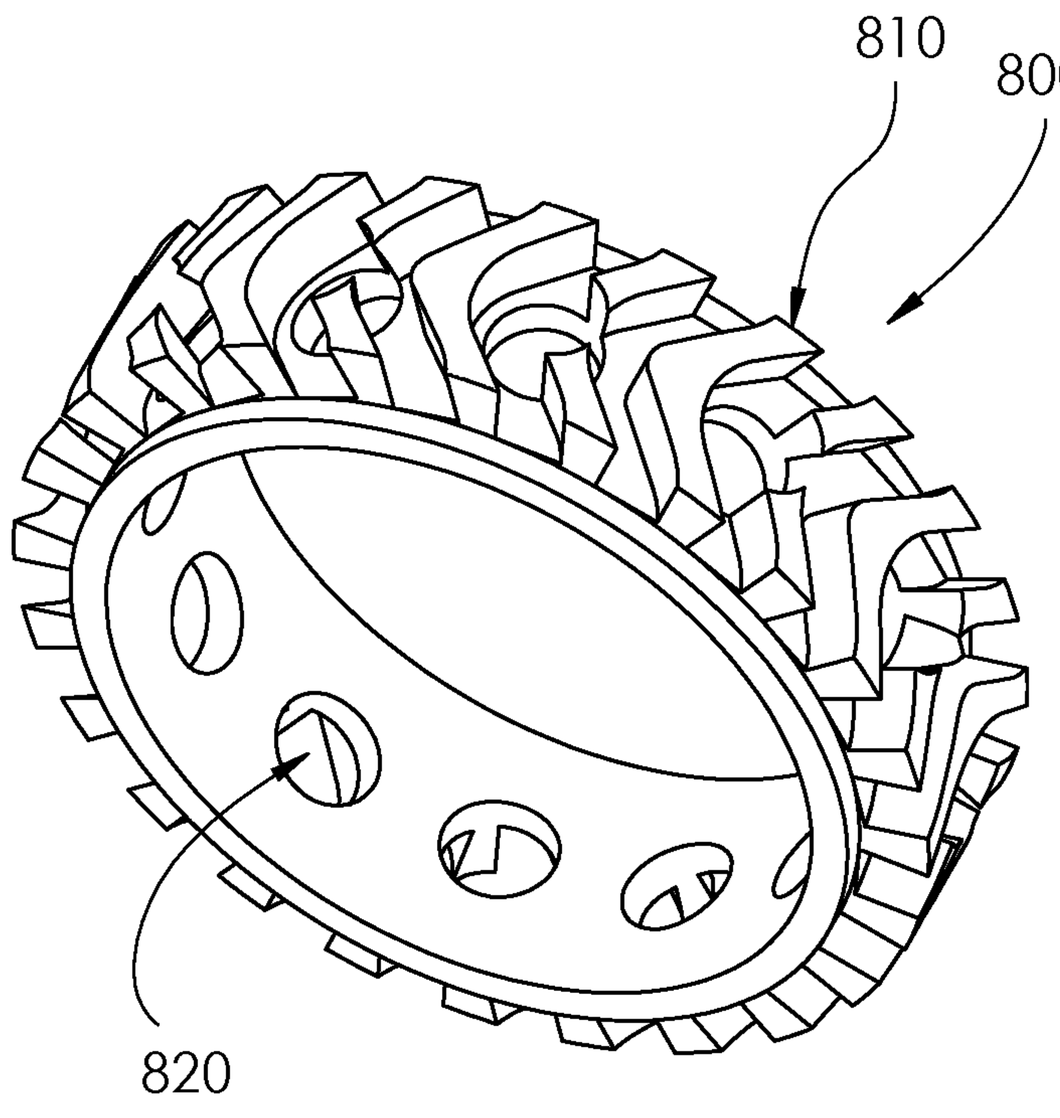


FIG. 8

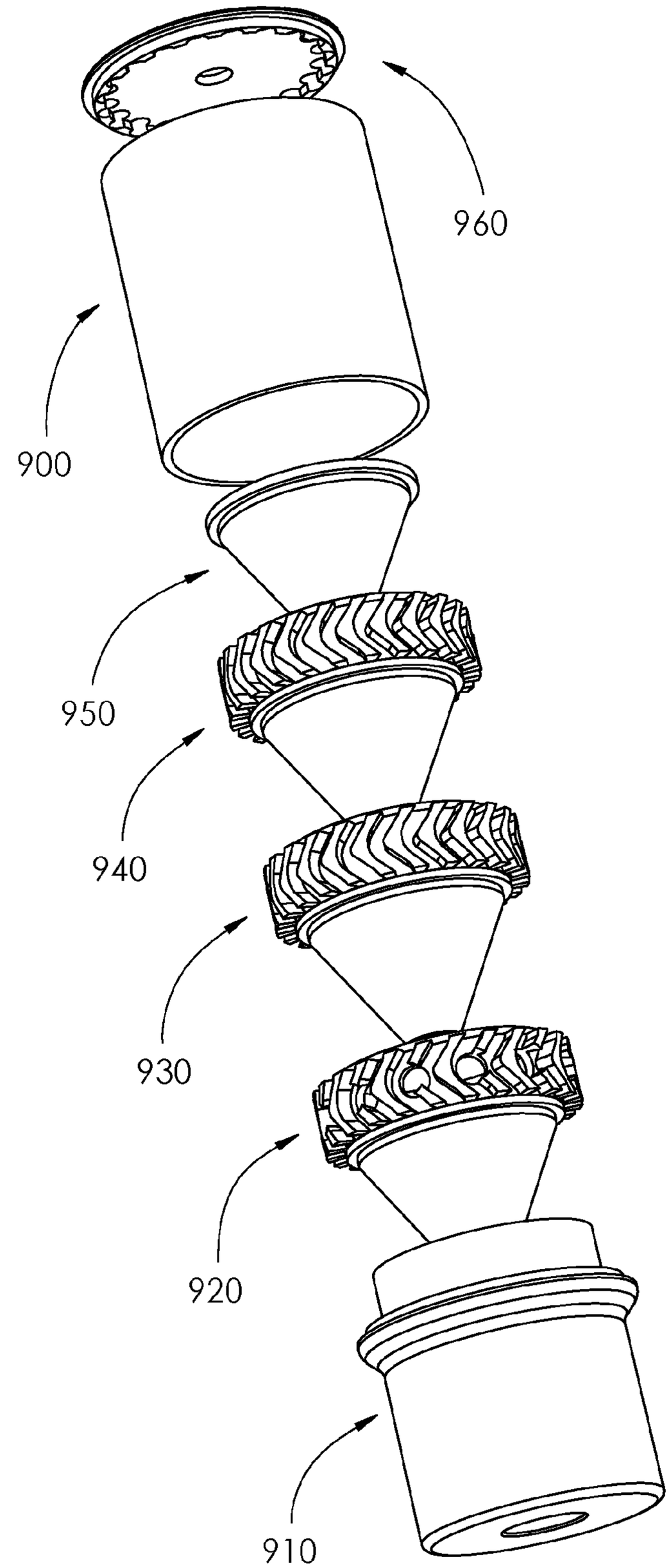


FIG. 9

SUPPRESSOR FOR A FIREARM

RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Application No. 62/413,076 filed Oct. 26, 2016. The entire contents of the above application are hereby incorporated by reference as though fully set forth herein.

BACKGROUND

[0002] This invention relates to suppressor or silencers for firearms. More particularly, this invention relates to specialized firearm barrel adaptations for suppressing gunfire noise.

[0003] To fire a bullet from a firearm, gunpowder is ignited behind a bullet. The gunpowder creates a high-pressure pulse of hot gas. The pressure of the gas forces the bullet down the barrel of the gun. When the bullet exits the end of the firearm barrel, the pressure behind the bullet is immense and just like popping the cork on a bottle; the "pop" sound it creates is very loud. The sound is from the initial pressure wave coming out the barrel. Additional gas comes out after the initial pressure wave but not as much as initial wave.

[0004] Known suppressor or silencers typically consist of an outer housing that is connectable to the end of the rifle barrel by screw threads. Traditional suppressor or silencers have a larger volume compared to the barrel (20 or 30 times greater). With the suppressor or silencer in place, the pressurized gas behind the bullet has a big space to expand into, decreasing the pressure of the heated gas. When the bullet finally exits through the hole in the suppressor or silencer, the pressure being released is decreased; therefore, the sound of the gun firing is much softer.

[0005] The interior of the housing of typical suppressor or silencers support a plurality of individual cone-shaped baffle members and spacers. There is a balancing act with suppressor or silencers used with many firearms. For example, in the case of the AR15 rifle if the suppressor or silencer is too efficient in slowing gas down, it builds up an excess amount of pressure in the rifle barrel, which ends up making the firearm not function properly.

[0006] In a traditional suppressor or silencer, the cone members are individually machined and are secured within the housing with a series of spacers between the cone members. The first conical shaped baffle joint where first baffle meets the external tube of the suppressor or silencer is the area that sees the highest pressure within the whole system. These baffles are typically formed of metal and are subjected to wear and corrosion caused by the explosive gases entering the housing. After a limited number of rounds, the baffles fail, particularly the first baffle. In order to increase the lifespan of the baffles, and consequently the lifespan of the suppressor or silencer, one must use materials that are hard to machine, which increases manufacturing costs. The entire suppressor or silencer is subject to an additional federal tax, which increases the cost of replacement.

[0007] There is a point of diminishing returns on efforts to eliminate sound from a firearm, as there is a super sonic crack from bullet. Instead, it is important to focus on inventive concepts that allow the suppressor or silencer to be made smaller, cheaper, stronger, more durable and/or lighter in weight.

[0008] Consequently, there is a need for a suppressor or silencer that puts less stress on the first chamber. Additionally, there is a need for baffles and spacers that are made from less costly materials yet allow a long lifespan of usage. Finally, there is a need for suppressor or silencers that can be made with lighter weight or less baffles yet still perform the silencing functions, resulting in shorter and/or lighter weight suppressors or silencers.

BRIEF SUMMARY OF THE INVENTION

[0009] The present invention seeks to meet these needs by providing a baffle for use in a firearm suppressor or silencer wherein the baffle directs the high-pressure gas away from the center of the suppressor or silencer. The baffle is a hollow tubular body of cylindrical cross section casing narrowing to a cone shape having sides that define an inlet and outlet end with an interior and exterior surface. The casing has an inlet end opening for receiving gas into the baffle and an outlet end opening through which the gas exits the baffle. The casing further has a plurality of apertures and an exterior flow passage or channel extending around the apertures on the exterior surface of the casing. The apertures and flow passages or channels are configured to turn the gas passing through the baffle from a first direction in which the gas exits towards the center of the baffle to a second direction in which the gas exits the baffle away from the center of the baffle.

[0010] The present invention also provides a spacer for use in a firearm suppressor or silencer wherein the spacer directs the high-pressure gas away from the center of the suppressor or silencer. The spacer is a hollow tubular body of cylindrical cross section casing having sides that define an inlet and outlet end with an interior and exterior surface. The casing has an inlet end opening for receiving gas into the spacer and an outlet end opening through which the gas exits the spacer. The casing further has a plurality of apertures and an exterior flow passage or channel extending around the apertures on the exterior surface of the casing. The apertures and flow passages or channels are configured to turn the gas passing through the spacer from a first direction in which the gas exits towards the center of the spacer to a second direction in which the gas exits the baffle away from the center of the spacer.

[0011] The present invention also provides a mount for use in a firearm suppressor or silencer wherein the mount directs the high-pressure gas away from the center of the suppressor or silencer. The mount is a hollow tubular body of cylindrical cross section casing having sides that define an inlet and outlet end with an interior and exterior surface. The casing has an inlet end opening for receiving gas into the mount and an outlet end opening through which the gas exits the mount. The casing further has a plurality of apertures. The apertures are configured to turn the gas passing through the mount from a first direction in which the gas exits towards the center of the mount to a second direction in which the gas exits the baffle away from the center of the mount.

[0012] The present invention also provides an improved suppressor or silencer for a firearm with a tubular housing having an interior cavity with a plurality of baffles or spacers described above that are capable of being nested with complimentary baffles or spacers having substantially the

same length and width and are positioned within the tubular housing having a center point aligned with a longitudinal axis of the tubular housing.

[0013] The high-pressure zone that is created in the first chamber of the suppressor or silencer is diverted around the outside of the mount, the baffles or the spacers and along the length of the suppressor or silencer tubular housing and evacuated out the front of the suppressor or silencer body. The time the gas pressure spends in first chamber is decreased as it is being evacuated out the front of the suppressor or silencer, thereby reducing the stress on the first chamber and corresponding baffles and increasing the lifespan of the suppressor or silencer. The design also avoids hot spots of gas and allows energy to be absorbed over the entire length of the suppressor or silencer tubular housing.

[0014] As the baffles or spacers used in the design are more efficient at absorbing energy, the number of baffles or spacers can be reduced, thereby providing a shorter and lighter weight suppressor or silencer barrel. Also, the baffles or spacers may be made out of less costly materials, such as a stainless steel, and still maintain a high level of performance. This results in a design that is less costly to make, lasts longer and is easier to use.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. **1** is a cross-sectional view of one embodiment of the suppressor or silencer of the present invention.

[0016] FIG. **2** is a perspective side view of the baffle of the present invention.

[0017] FIG. **3** is a cross-sectional view of one embodiment of the suppressor or silencer of the present invention.

[0018] FIG. **4** an exploded side view of one embodiment of the suppressor or silencer of the present invention.

[0019] FIG. **5** is an exploded cross-sectional view of one embodiment of the suppressor or silencer of the present invention.

[0020] FIG. **6** is a perspective side view of the spacer of the present invention.

[0021] FIG. **7** is a cross sectional perspective view of the mount of the present invention used in a suppressor or silencer.

[0022] FIG. **7** is a perspective side view of the spacer of the present invention.

[0023] FIG. **9** an exploded side view of one embodiment of the suppressor or silencer of the present invention.

DETAILED DESCRIPTION

[0024] Turning to FIG. **1**, the suppressor or silencer for a firearm of the present invention is shown in cross sectional detail. The tubular casing **100** is threaded at **110** onto the end of the firearm (not shown). The bullet travels along the path of A, exiting the hole **120**. The gas travels along path A and exits out of hole **120**. The gas also travels along path B and expands into the chambers created by a series of cone-shaped nested baffles, shown as **140**A-D, which usually have a smooth and continuous outer surface **150**A-C. Sometimes the outer surface of one or more **150**A-C is dimpled. The gas also exits along path C, through hole **160**, and exits out of holes at the end of the suppressor or silencer (example hole shown as **170**), with the bulk of the gas creating pressure in the first chamber **130**.

[0025] Turning to FIG. **2**, the baffle of the present invention is shown wherein the baffle directs the high-pressure gas away from the center of the suppressor or silencer. The baffle is a hollow tubular body of cylindrical cross section casing **201** narrowing to a cone shape having sides that define an inlet end E and outlet end F with an interior and exterior surface. The casing **201** has an inlet end E opening for receiving gas into the baffle and an outlet end F opening through which the gas exits the baffle. The casing **201** further has a plurality of apertures **210** and may have an exterior flow passage or channel **220** extending around the apertures **210** on the exterior surface of the casing **201**. The apertures **210** and flow passages or channels **220** are configured to turn the gas passing through the baffle from a first direction through inlet end E in which the gas exits towards through the center of the baffle towards outlet end F to a second direction in which the gas exits through the aperture **210** and directed by the flow passages or channels **220** away from the center of the baffle.

[0026] Turning to FIG. **3**, the suppressor or silencer for a firearm of the present invention is shown in cross sectional detail. As shown in FIG. **1**, the tubular casing **100** is threaded at **110** onto the end of the firearm (not shown). The bullet travels along the paths of A and out of hole **120**. The gas also travels along path B and expands into the chambers created by a series of the cone-shaped nested baffles **240**A-D. Baffle **240**A directs the high-pressure gas away from the center of the suppressor or silencer. The baffle **240**A a hollow tubular body of cylindrical cross section casing **201** with a plurality of apertures **210** on the exterior surface of the casing **201**. The apertures **210** are configured to turn the gas passing through the baffle from a first path A towards a second direction path for the gas C in which the gas exits through the aperture **210** and directed away from the center of the baffle. While FIG. **3** shows the use of only one baffle shown in FIG. **2**, several baffles of the present invention may be used simultaneously to further direct gas away from the center of the baffles, such as those shown in FIG. **4**.

[0027] Views of the suppressor or silencer of the present invention are shown as exploded side view (FIG. **4**) and exploded cross section (FIG. **5**). Turning to FIG. **4**, the tubular housing **400** has an interior cavity with a plurality of baffles **430**, **440**, **450** and **460** (shown in further detail in FIG. **2**) that are capable of being nested with complimentary baffles substantially the same length and width and are positioned within the tubular housing **400** having a center point aligned with a longitudinal axis of the tubular housing **400**. The suppressor or silencer is threaded onto the firearm at the first chamber **410**. The mount has a casing having at least one, but preferably a series of apertures along the perimeter of the exterior surface of the casing. The bullet moves through the first chamber **410**, through the baffles **430**, **450** and **450** in the tubular housing **400** and through the last baffle **460** and exiting through end cap **470**. In one embodiment, the baffles have apertures configured to turn the gas passing through the suppressor from a first direction through the center of the suppressor to a second direction in which the gas exits through the apertures and is directed by the flow passages or channels away from the center of the suppressor and through the length of the tubular casing **400**. In another embodiment, the baffles may be like that shown in FIG. **2**, wherein the baffles have both apertures **210** and flow passages or channels **220** configured to turn the gas passing through the suppressor from a first direction through the center of the suppressor to a second direction in which the gas exits through the apertures and is directed by the flow

passages or channels away from the center of the suppressor and through the length of the tubular casing **400**.

[0028] Turning to FIG. **5**, the tubular casing **530** houses the nested baffles **550**, **560**, **570**, **580**, **590**, **600**, **610** and **620**, which may be separated by traditional spacers or spacers like those shown in detail in FIG. **6**. The suppressor or silencer threads onto the firearm at **500**. The bullet travels through the baffles in the tubular casing towards the end **510** and out the hole **520**. In one embodiment, the baffles have apertures configured to turn the gas passing through the suppressor from a first direction through the center of the suppressor to a second direction in which the gas exits through the apertures and is directed by the flow passages or channels away from the center of the suppressor and through the length of the tubular casing **530**. The mount has a casing having at least one, but preferably a series of apertures **540** along the perimeter of the exterior surface of the casing.

[0029] In another embodiment, the baffles may be like that shown in FIG. **2**, wherein the baffles have both apertures **210** and flow passages or channels **220** configured to turn the gas passing through the suppressor from a first direction through the center of the suppressor to a second direction in which the gas exits through the apertures and is directed by the flow passages or channels away from the center of the suppressor and through the length of the tubular casing **400**.

[0030] Turning to FIG. **6**, a spacer shown therein may be used between the baffles of the present invention or traditional baffles. The spacer has a casing **600** having at least one, but preferably a series, of exterior flow passages or channel **610** extending around the exterior surface of the casing **600**. As shown in FIG. **8**, the spacer may also have apertures **820** along the perimeter of the exterior surface of the casing.

[0031] Turning to FIG. **7**, a mount shown therein may be used to interface between the firearm and first baffle. The mount has a casing **700** having at least one, but preferably a series of apertures **720** along the perimeter of the exterior surface of the casing.

[0032] Turning to FIG. **9**, views of the suppressor or silencer of the present invention are shown as exploded side view. The tubular housing **900** has an interior cavity with a plurality of baffles **920**, **930**, **940** and **950** (shown in further detail in FIG. **2**) that are capable of being nested with complimentary baffles substantially the same length and width and are positioned within the tubular housing **900** having a center point aligned with a longitudinal axis of the tubular housing **900**. The suppressor or silencer is threaded onto the firearm at the first chamber **910**. The bullet moves through the first chamber **910**, through the baffles **920**, **930**, **940** and **950** in the tubular housing **900** and exiting through end cap **960**. In one embodiment, the baffles have apertures configured to turn the gas passing through the suppressor from a first direction through the center of the suppressor to a second direction in which the gas exits through the apertures and is directed by the flow passages or channels away from the center of the suppressor and through the length of the tubular casing **900**.

[0033] For the purposes of promoting an understanding of the principles of the invention, reference has been made to the preferred embodiments illustrated in the drawings, and specific language has been used to describe these embodiments. However, this specific language intends no limitation of the scope of the invention, and the invention should be construed to encompass all embodiments that would normally occur to one of ordinary skill in the art. The particular implementations shown and described herein are illustrative examples of the invention and are not intended to otherwise limit the scope of the invention in any way. For the sake of brevity, conventional aspects of the system (and components of the individual operating components of the system) may not be described in detail. Furthermore, the connecting lines, or connectors shown in the various figures presented are intended to represent exemplary functional relationships and/or physical or logical couplings between the various elements. It should be noted that many alternative or additional functional relationships, physical connections or logical connections may be present in a practical device. Moreover, no item or component is essential to the practice of the invention unless the element is specifically described as "essential" or "critical". Numerous modifications and adaptations will be readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.

What is claimed is:

1. A suppressor for a firearm configured to turn gas passing through the suppressor from a first direction of a central trajectory through the suppressor to a second direction in which the gas is directed away from the center of the suppressor and through the length of the suppressor.

2. A suppressor for a firearm comprising:

a. a tubular housing of cylindrical cross section having an interior cavity;

b. a plurality of baffles with a hollow tubular body of cylindrical cross section having sides that define a gas inlet and a gas outlet end, an interior and exterior surface, and are nested within each other in the interior cavity; and

c. a plurality of apertures on the exterior surface of the baffles.

3. The suppressor of claim **2** wherein the apertures direct gas passing through the suppressor from a first direction through a center of the suppressor to a second direction in which the gas exits through the apertures and is directed away from the center of the suppressor and through a horizontal length of the tubular casing.

4. The suppressor of claim **2** further comprising at least one exterior flow passage or channel on the exterior surface of the baffle and extending upwards from the exterior surface of the baffle around the apertures.

5. The suppressor of claim **4** wherein the flow passages or channels of the baffle are configured to turn gas passing through the apertures away from the center of the suppressor and through a horizontal length of the tubular casing.

6. The suppressor of claim **2** wherein each of the plurality of baffles has a center point aligned with a longitudinal axis of the baffle and wherein the tubular housing has a center point aligned with a longitudinal axis of the tubular housing.

7. The suppressor of claim **6** wherein the center points of the baffles align with the center point of the tubular housing.

8. The suppressor of claim **2** wherein the each of the plurality of baffles narrow to a cone shape at the gas outlet end.

9. The suppressor of claim **2** further comprising

a. an outer casing with a proximal and a distal end;

b. a plurality of apertures around a perimeter of the casing at the distal end; and

c. a threaded connection along an interior perimeter of the casing at the proximal end.

10. The suppressor of claim **2** further comprising at least one spacer between two of the baffles, the spacer comprising:

a. a hollow tubular body of cylindrical cross section with an interior and exterior surface; and

b. at least one exterior flow passage or channel on the exterior surface of the baffle and extending upwards from the exterior surface of the baffle.

11. The suppressor of claim **10** wherein the flow passages or channels of the spacers are configured to turn gas passing through the apertures of the baffles away from the center of the suppressor.

12. The suppressor of claim **10** further comprising a plurality of apertures on the exterior surface of the spacer wherein the exterior flow passages or channels are around the aperture.

13. The suppressor of claim **12** wherein the flow passages or channels of the spacer are configured to turn gas passing through the suppressor from a first direction through a center of the suppressor to a second direction in which the gas exits through the apertures and is directed by the flow passages or channels away from the center of the suppressor and through a horizontal length of the tubular casing.

14. A baffle for use in a firearm suppressor comprising:

a. a hollow tubular body of cylindrical cross section having sides that define a gas inlet and gas outlet end with an interior and exterior surface; and

b. a plurality of apertures on the exterior surface of the baffle.

15. The baffle of claim **14** wherein the apertures direct gas passing through the baffle from a first direction through a center of the baffle to a second direction in which the gas exits through the apertures and is directed away from the center of the baffle.

16. The baffle of claim **14** further comprising at least one exterior flow passage or channel on the exterior surface of the baffle and extending upwards from the exterior surface of the baffle around the apertures.

17. The baffle of claim **14** wherein the flow passages or channels are configured to turn gas passing through the baffle from a first direction through a center of the baffle to a second direction in which the gas exits through the apertures and is directed by the flow passages or channels away from the center of the suppressor.

18. A spacer for use in a firearm suppressor comprising:

a. a hollow tubular body of cylindrical cross section having sides that define an inlet and outlet end with an interior and exterior surface; and

b. an exterior flow passage or channel extending around the apertures on the exterior surface of the spacer.

19. The spacer of claim **18** wherein the flow passages or channels are configured to turn gas passing around the outside of the spacer from a first direction through a center of the spacer to a second direction in which the gas exits through the apertures and is directed by the flow passages or channels away from the center of the spacer and through a horizontal length of the spacer.

20. The spacer of claim **18** further comprising a plurality of apertures on the exterior surface of the spacer.

21. The spacer of claim **20** wherein the flow passages or channels are configured to turn gas passing through the spacer from a first direction through a center of the spacer to a second direction in which the gas exits through the apertures and is directed by the flow passages or channels away from the center of the spacer and through a horizontal length of the spacer.

22. A mount for use in a firearm suppressor comprising

a. an outer casing with a proximal and a distal end;

b. a plurality of apertures around a perimeter of the casing at the distal end; and

c. a threaded connection along an interior perimeter of the casing at the proximal end.

* * * * *