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(54) Title: F.U.N TUNNEL(S)

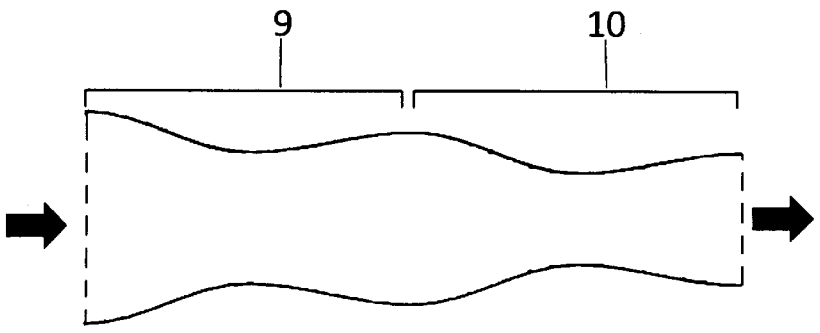


FIG. 2

(57) Abstract: The F.U.N Tunnel is a pipe of unique design capable increasing the mass flow rate of a compressible and/or incompressible flow, including but not limited to: water, gas, liquid, particulate, plasma, and/or other fluid state or any combination thereof whether the flow is human and/or naturally made such that the tunnel produces a net decrease in pressure and a net increase in speed of a flow. The tunnel(s) can be used to augment flow to, from, in, at, and/or around turbines and/or rotors. The Tunnel(s) can be placed in a series.

TITLE OF INVENTION

F.U.N. Tunnel(s)

INVENTORS

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CROSS REFERENCE

This Invention, The F.U.N Tunnel(s) claims the filing date of provisional patent 61/462,882 with priority filing date 02/09/2011 and provisional patent 61/463,558 with priority date 02/18/2011.

SPECIFICATION

TECHNICAL FIELD

The present invention relates to venturi tunnel(s) used for a wide variety of industrial uses including but not limited to directing flows to, towards, from, in, and/or around electricity producing turbines and pipelines.

BACKGROUND

The de laval nozzle/venturi tunnel has been used in industry for many years to increase the mass flow rate of a compressible flows, however it does not work for incompressible flows. The F.U.N Tunnel(s) are a series of and/or single nozzle(s)/pipe(s)/turbine duct(s) capable of increasing the mass flow rate of incompressible and compressible flows including but not limited to water, liquid, gas, steam, and/or plasma to be used in any industrial application that would benefit from greater mass flow rate of incompressible or compressible flows including but not limited to ducts for turbines, nozzles, and/or pipes.

BRIEF SUMMARY OF THE INVENTION

The F.U.N. Tunnel(s) is a tested and proven single and/or series of nozzles/pipe(s)/turbine duct(s) designed to increase the mass flow rate of an incompressible and/or compressible flow to be used used in any industrial application including but not limited to ducts for turbines, nozzles, and pipes.

DESCRIPTION OF THE DRAWINGS

Note: Filled arrows mark direction of flow. All F.U.N Tunnel(s) can incorporate mixing nozzles.

FIG. 1A, 1B, and 1C: These pictures depict some of the possible shapes of The F.U.N. Tunnel(s) that adhere to the invention claims.

FIG. 2: This image depicts a cross sectional diagram of The F.U.N. Tunnel(s). 9 marks the first venturi in the series and 10 marks the second venturi in the series. The arrow depicts the direction of flow through the tunnel(s) which is implied thereafter in all the drawings.

FIG. 3: This image depicts a cross sectional diagram of The F.U.N. Tunnel(s). 11, 12, and 13 mark a series of 3 venturis.

FIG. 4: This figure depicts a cross sectional diagram of The F.U.N. Tunnel(s). 14 marks the entrance chamber, 15 marks the middle chamber, 16 marks the exit chamber. 17 marks the point of peak cross sectional area of the entrance chamber, 18 marks the first constriction point, 19 marks the point of peak cross sectional area of the middle chamber, 20 marks the second constriction point, and 21 marks the point of peak cross sectional area of the exit chamber; note the decreasing peak cross sectional areas of the chambers. 22 marks the midline of the tunnel(s) which can change position and direction.

FIG. 5: Figures 5A, 5B, and 5C depict cross sectional diagrams of a single venturi system(s) placed around The F.U.N. Tunnel(s) as set forth in claim 5. Brackets used to attach tunnel(s) together are not shown in the drawing due to the view needed to understand the drawing.

FIG. 6: This figure depicts a cross sectional diagram of two F.U.N. Tunnel(s) in an exit to entrance series; this configuration is possible due to the claims set forth in claims 5 and 6. Brackets used to attach tunnel(s) together are not shown in the drawing due to the required view.

FIG. 7: This figure depicts a cross sectional diagram of three F.U.N. Tunnel(s) arranged in an exit to entrance series with a fourth F.U.N. Tunnel(s) placed around the exit to entrance series; this is possible due to the claims set forth in claims 5 and 6. Brackets used to attach tunnel(s) together are not shown in the drawing due to the required view.

FIG. 8: This figure depicts a cross sectional diagram of The F.U.N. Tunnel(s), being integrated into an additional type of flow augmenter, mixing nozzles can be integrated.

FIG. 9: F.U.N Tunnel(s) adjoined to other F.U.N Tunnel(s).

FIG. 10: A series of F.U.N Tunnel(s), more segments can be added to the series.

FIG. 11: A Series of F.U.N Tunnel(s) with a single venturi placed around the series, the single venturi can be replaced with a F.U.N Tunnel and more segments can be added.

FIG. 12: Multiple F.U.N Tunnel(s) adjoined to each other.

FIG. 13: A series of F.U.N Tunnel(s) with a single venturi placed around the series, more segments can be added.

FIG 14: A series of F.U.N Tunnels with a F.U.N Tunnel placed around the series, ore segments can be added.

FIG 15: The F.U.N Tunnel(s) integrated into a pipe.

DETAILED DESCRIPTION OF THE INVENTION

The F.U.N. Tunnel(s) are materially different from conventional venturi systems because it can increase the mass flow rate of in incompressible flow in addition to compressible flows.

The F.U.N. Tunnel(s) is a series and/or single pipe of pipe(s) is a single and/or series of pipes used to augment flows. The basic unit of this series of pipes is an open pipe(s) comprised of a converging entrance chamber, diverging then converging middle chamber(s), and a diverging exit chamber resulting in a pipe with multiple constriction points creating a series of venturis with peak cross sectional areas of the chambers decreasing from entrance chamber to middle chamber(s) to exit chamber, thus generating a net decrease in pressure and a net increase in speed of the matter flowing through the length of the pipe, simply put the tunnel(s) generates an decrease of pressure and an increase of speed in matter flowing over a distance. This is accomplished because the pressure at the entrance of a venturi is lower than the pressure at the entrance of a previous venturi along the length of the invention. The function of the invention is to increase mass flow rate of incompressible and compressible flows.

Under the previously mentioned principles, the number of chambers can change, the position of the points of peak cross sectional areas can change position along the length and width of the tunnel(s), the length of venturis in the series can change, the lengths of the chambers can change, the cross sectional shapes of the tunnel(s) can change, the magnitude/degree that the tunnel(s) converge and diverge can change, so long as the tunnel(s) walls maintain the proper converging and diverging angles and the peak cross sectional areas decrease from entrance chamber to the middle chamber(s) to the exit chamber such that the pressure at the point that one venturi ends in the pipe and another begins is lower than the pipes entrance pressure and the venturis act as one system, not a series of venturis, but a system known as F.U.N Tunnel(s). This system is capable of increasing the mass flow rate if an incompressible flow.

When connected to each other by any manner of bracket, magnet, or method of suspension in an exit to entrance series with other pipes of the same design, non-venturi pipes, and/or single/multiple venturis, a system is created, furthermore pipes of the same design and/or single/multiple venturis can be integrated inside, outside, before, after, and/or around the series. This series of pipes lowers the

pressure of a flow and increases the speed of a flow over a distance. Mixing nozzles can be integrated into these series as a method of facilitating the mixing of the different speed flows. A number of these systems are depicted in the figures, all of which function to decrease the pressure and increase the speed to a greater degree than a single F.U.N. Tunnel. Just like the single F.U.N. Tunnel, the series of F.U.N. tunnels functions as a flow accelerator and pumping mechanism. The configuration of the system can change so long as the system still functions as previously described. This system is capable of increasing the mass flow rate of an incompressible flow.

The F.U.N. Tunnel(s) can augment the flow of water, gases, liquids, plasma, steam, particulate flows, compressible flows, incompressible flows, and any combination of matter, and can be composed and/or coated with any material needed to facilitate the flow of said matter.

The F.U.N Tunnel(s) can be directed toward each other and/or adjoined to each other.

The F.U.N. Tunnel can be used throughout industry wherever a flow is present, and wherever the industrial application can benefit from an increased mass flow rate. The surfaces of The F.U.N. Tunnel can be augmented depending on the intended application and so can the dimensions.

Some of the industrial uses include acting as, creating new, our being incorporated into including but not limited to turbine ducts, nozzles, pipelines, propulsion systems, pumps, coolant systems, combustion systems, whether liquid, water, gas, steam, and/or plasma.

The F.U.N. Tunnel can be integrated into existing systems, and utilize existing systems to augment the properties of its flow, including existing types of nozzles, turbine ducts, and/or flow augmenters.

Structures can be added to the systems to facilitate necessary industrial purpose.

Diffusers can be integrated in the system to decrease the speed and increase the pressure.

CLAIMS

Claim 1: The F.U.N. Tunnel(s), for the purpose of these claims referred to as tunnel(s), is used to augment the properties of any flow, including but not limited to: gas, liquid, steam, water, particulate, plasma, and/or other fluid state or any combination thereof whether the flow is human and/or naturally made for a multitude of industrial uses including but not limited to facilitating the generation of electrical power, acting as a turbine duct, directing a flow towards a turbine, directing a flow away from a turbine, transporting flows, and/or being used as a nozzle; it is an open pipe(s) comprised of a converging entrance chamber, diverging then converging middle chamber(s), and a diverging exit chamber resulting in a pipe(s) with multiple constriction points creating a series of venturis with peak cross sectional areas of the chambers decreasing from entrance chamber to middle chamber(s) to exit chamber, thus creating a net decrease of pressure and a net increase of speed in the matter flowing throughout the length of the pipe(s), furthermore the position of the points of peak cross sectional areas can change position along the length and width of the tunnel(s), the length of venturis in the series can change, the lengths of the chambers can change, the cross sectional shapes of the tunnel(s) can change, the magnitude that the tunnel(s) converge and diverge can change, so long as the tunnel(s) walls maintain the converging and diverging angles such that the pressure at the point that one venturi ends and another begins in the series is lower than the tunnel(s) entrance pressure and/or the beginning of the previous venturi; the purpose of this configuration is to decrease the pressure and increase the speed of matter flowing over a distance.

Claim 2: When F.U.N tunnel(s) are connected to each other by any manner of bracket, magnet, or method of suspension in an exit to entrance series and/or an entrance to exit series with other pipes of the same design, non-venturi pipes, and/or single/multiple venturis, a system is created, furthermore pipes of the same design straight pipes, shaped pipes, F.U.N Tunnel(s) and/or single/multiple venturis systems, and or any other structure can be integrated before, after, outside, beside, inside and/or around the series. This series of pipes systematically lowers the pressure of a flow and increases the speed of a flow over a distance; the more pipes added to the series, the lower the pressure and faster the flow; Mixing nozzles can be integrated into these series as a method of facilitating the mixing of the different speed flows to be used as a turbine duct, pipe, nozzle, and/or propulsion system and be used

for all the same industrial applications as a single F.U.N Tunnel; segments can be added, and it can be used to augment flows of water, liquid, gas, steam, wind, and/or plasma.

Claim 3: The F.U.N Tunnel(s) can increase the mass flow rate of an incompressible flow and can be used in any industrial application that benefits from an increased mass flow rate of an incompressible flow including but not limited to turbine ducts, nozzles, and pipes.

Claim4: Pursuant to claim 1, Tunnels can be adjoined to other tunnels.

Claim 5: Pursuant to claim 1, the Tunnel(s) can be used as pipes and/or be integrated into pipes and piping systems.

Claim 6: Pursuant to claims 1 the F.U.N Tunnels can act as ducts for turbines including but not limited to hydroelectric turbines, steam turbines, wind turbines, gas turbines, plasma turbines, and/or combustion turbines no matter what method the turbine spins whether spun by lift, drag, or other method.

Claim 7: As to the tunnel(s) set forth in claim 1, any chamber may diverge to the point or past the point of the established baseline entrance pressure of the flow; furthermore a diffuser, condenser, or mixer can be placed on the end of the tunnel(s).

Claim 8: As to the tunnel(1) set forth in claim 1, the midline of the tunnel(s) can but does not have to remain straight, allowing the tunnel(s) augment flow in a desired direction(s).

Claim 9: As to the tunnel(s) set forth in claim 1, the tunnel(s), mixers, nozzles, mixing nozzles, multi-venturi system(s), single venturi system(s), smooth pipe(s), and or non-smooth pipes can be placed inside a tunnel(s) into the entrance and/or exit and/or around the entrance and/or exit of another tunnel(s) before, as, after, or at the entrance and/or exit, and/or any of the constriction points, or any position along the length of the tunnel(s) and/or position near the tunnel, and this can be repeated, multiple times separately or in a series.

Claim 10: As to the tunnel(s) set forth in claim 1, the exit of one tunnel can be placed inside the entrance of another tunnel past the first constriction point creating an exit to entrance series, and this can be repeated with or without additional tunnel(s), funnels, multi venture systems, mixing nozzles, smooth pipes, and/or single venturi(s) systems placed inside, before, at, after, and or around the

aforementioned tunnels, which also can be repeated, and this can be used as but not limited to a nozzle, pipeline, and/or can be used to facilitate the generation of electricity or motion by directing any flow, including but not limited to a water current, wind current, exhaust current, combustion, and/or steam current to be used to spin a rotor; as this configuration performs the exact same function as a single tunnel, increasing the speed of a flow while decreasing the pressure of matter flowing over a distance, thus it can be used for the exact same industrial uses as a single tunnel and is the same invention.

Claim 11: The tunnel(s) of claim 1 can be used to augment the flow in pipelines including but not limited to pipelines moving natural gas, oil, petroleum products, coolant, bio-fuels, water, liquid chemicals, and or vapors.

Claim 12: The tunnel(s) of claim 1 can be used to augment the flows needed to propel projectiles.

Claim 13: The tunnel(s) of claim 1 can be used to augment the flows present and can be used as a propulsion system in propulsion systems including but not limited to flows around, to, and/or from propellers.

Claim 14: The tunnel(s) of claim 1 can act as a combustion chamber and/or be used to transport flows to, around, in and/or from combustion engines.

Claim 15: The tunnel(s) of claim 1 can be composed of any material, including but not limited to: polymer, metal, mineral, composite, carbon, fibrous.

Claim 16: To help reduce the impact of the dissipating forces the tunnel(s) of claim 1 can be coated with any form of friction reducing material including but not limited to ultra-low wear carbon coatings, polyethylene, and/or fluoropolymers.

Claim 17: The tunnel(s) of claim 1 can be infused with magnets at any point along the tunnel(s), and/or the tunnel(s) can be composed from a magnetic field.

Claim 18: The tunnel(s) of claim 1 can be used as a duct for a turbine and/or to augment flows towards and/or away from a turbine, rotor, and/or generator whether the flow is a water current, steam current,

wind current, gas current, and/or exhaust current whether the flow is naturally and/or human generated.

Claim 19: Devices needed to generate electricity can be used in combination with the tunnel(s) of claim 1; this includes but is not limited to brackets to attach multiple tunnel(s)s together, brackets to attach tunnels to other fixtures, brackets to attach fixtures to the tunnel(s), pumps, inlet valves, outlet valves, grates, anodes, cathodes, hinges, filters, turbines spun by drag, turbines spun by opposing lift along a central axis, coils, permanent magnets, fins, funnels, brushes, field coils/electromagnets, bearings, capacitors, batteries, wires, stators, armatures, commutators, and/or governors.

Claim 20: The tunnel(s) of claim 1 can be used as, in, around, before, and/or after jets, fans, ventilation, blowers, and/or pumps.

Claim 21: The tunnel(s) of claim 1 can be used as, in, around, before, and/or after fuel injectors.

Claim 22: The tunnel(s) of claim 1 can be used as, in, around, before, and/or after blast furnaces.

Claim 23: The tunnel(s) of claim 1 can be used as, in, around, before, and/or after a nozzle(s).

Claim 24: The tunnel(s) of claim 1 can be used to augment the flows of human produced waste, circulation systems, and/or ventilation systems.

Claim 25: The thickness of the walls throughout the tunnel(s) of claim 1 can change, including but not limited to tapering the entrance and/or the exit walls of the tunnel(s).

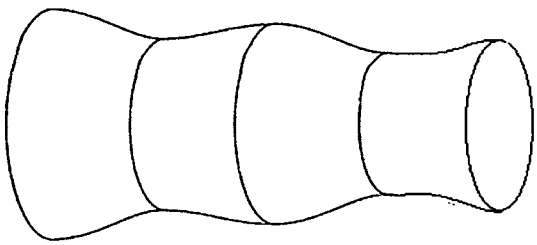
Claim 26: Any device and/or fixture including but not limited to: mechanical, electrical, magnetic, thermal, nuclear, and/or chemical devices/fixtures can be placed and/or attached around, to, near, and/or in the tunnel(s) and/or in any position in relation to the tunnel(s) of claim 1.

Claim 27: The tunnel(s) of claim 1 can be used to augment flows to, from, toward, in, through, around, and in any direction and/or position in relation to and/or function as and/or be integrated into and/or to facilitate and/or be incorporated into the design of in any way of the following but not limited to: rivers, water channels, reservoirs, lakes, levies, dams, turbine ducts, the neck of a bottle and/or can, dykes, ocean currents, wind current, water current, steam flow, exhaust, plumbing, irrigation, existing hydroelectric facilities, run of the river hydroelectric generators, drainage, smoke stacks, thermal vent, exhaust outlet, exhaust oulets, flow inlets, flow outlets, bypass, chimney, steam stacks, flues, fans, blowers, siphons, water propulsion systems, pumps, compressors, combustion engines, accelerating projectiles, pipelines, tubing, steam turbine generators, chimney, hydroelectric generators, dispensers, wind electric energy generators, liquid jets, mixers, gas jets, plasma jets, blast forges, shower head, transportation vehicles, house hold appliances, freezers, convection ovens, kilns, fuel injectors, combustion engines, sewage systems, drainage, ventilation, papermaking, defoaming system, human/industrial waste, heating, air conditioning, circulation systems, nozzles, coolant systems, mining, funnel, squirt gun, stent, keel, gutter, hair drier, filtration, water runoff, spigots, water cutters, plasma cutters, cutters, plasma ray, lasers, sprinklers, fountains, public/private water systems, spouts, sprayers, musical instruments, water mains, water towers, marine vessels, flood control, respirators, inhalers, oil/natural gas wells, filtration, eductors, inspirators, aspirators, siphons, Atomizers, Carburetors, kitchen appliances, wine aerators, protein skimmers, vacuum generators, vacuum cleaners, water slides, water jets, venturi scrubbers, turbines, propellers, ejectors, steam injectors, steam ejectors, sand blasters, bilge emptying system, scuba diving regulator, vaporizers, medical applications, oxygen masks,, centrifuge, geo-thermal heating/cooling systems, wells, storage containers, venturi masks, magnetic nozzles, propulsion systems, to spin a turbine/generator, to move fluids, to facilitate/provide flow, and any human or naturally generated/augments flows and/or industrial products with single venturi tunnel applications.

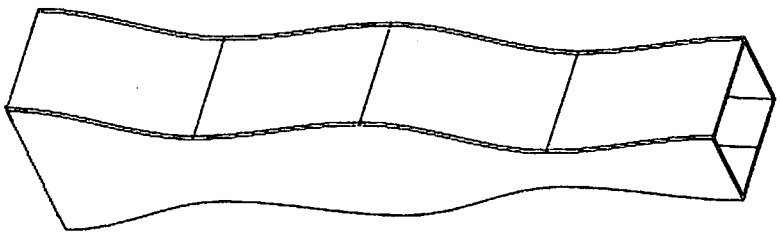
Claim 29: The tunnel(s) of claim 1 can have perforations and/or augmentations to the surfaces of the tunnel including but not limited to inlet and outlet valves at any position along the tunnel(s), ridges, mixers, funnels, grooves, channels, and/or lobes(s).

Claim 30: The tunnel(s) can have any cross section shapes as long as the tunnel(s) functions as set forth in claim 1.

Claim 31: The Tunnel(s) set forth in claim 1 can change dimensions.



1A



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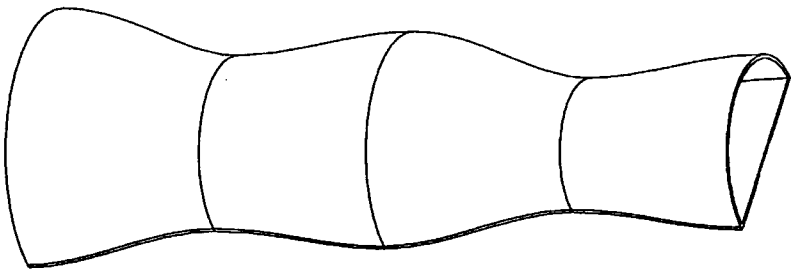

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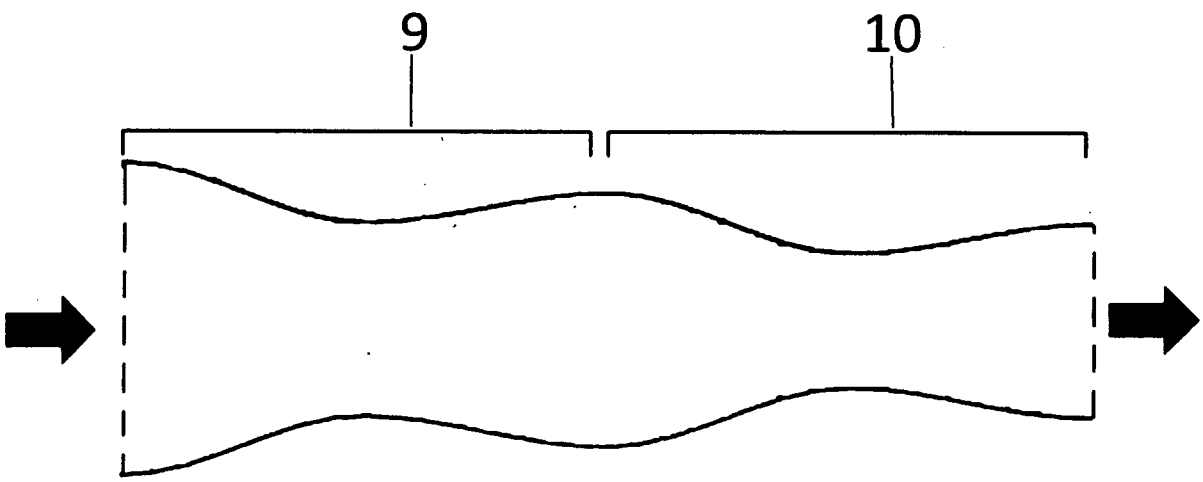


FIG. 2

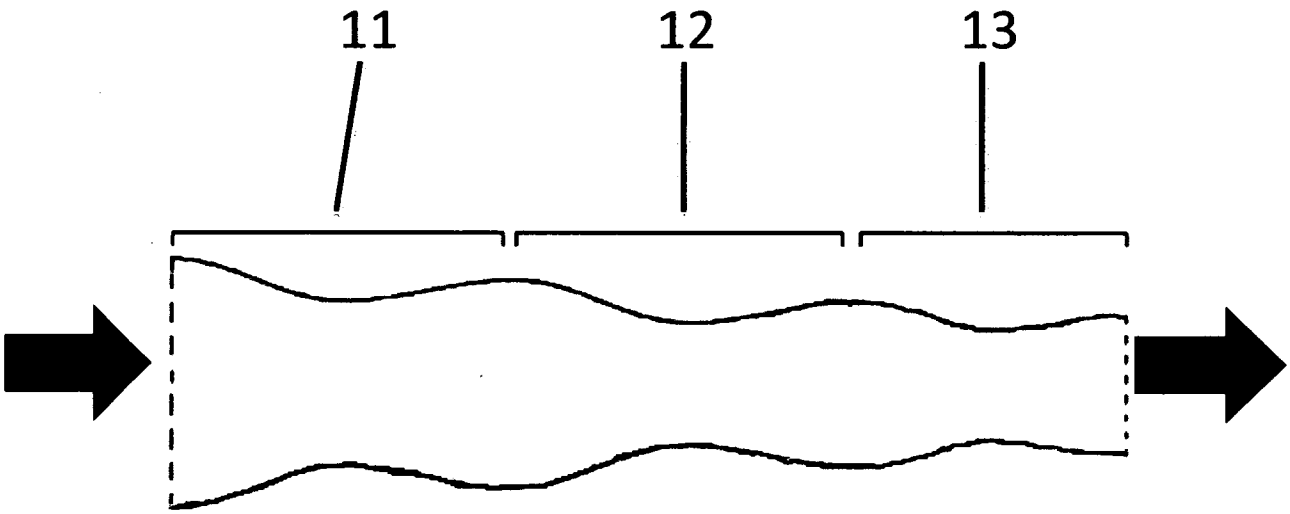


FIG. 3

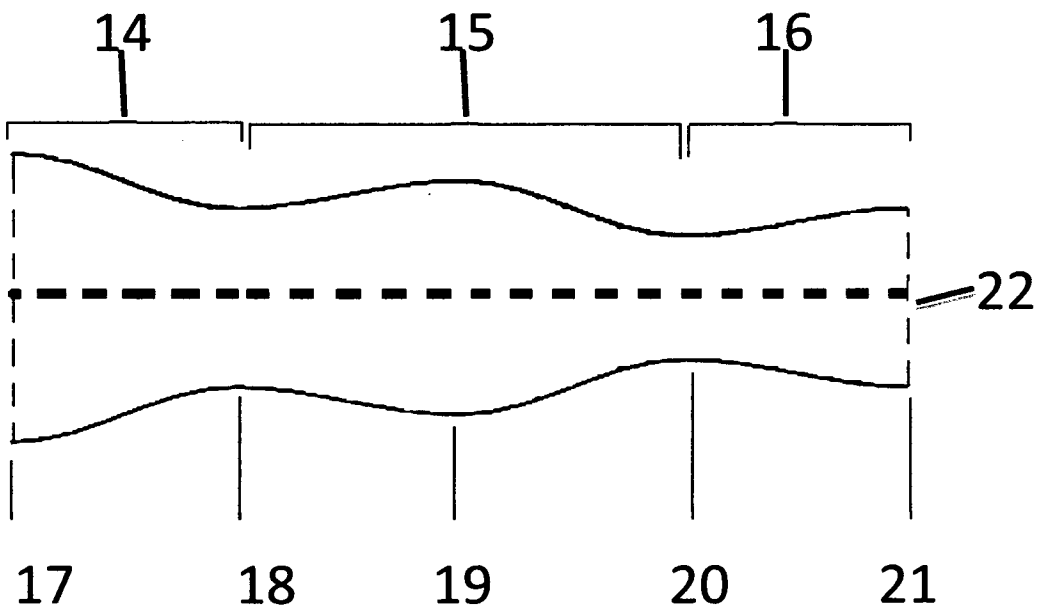


FIG. 4

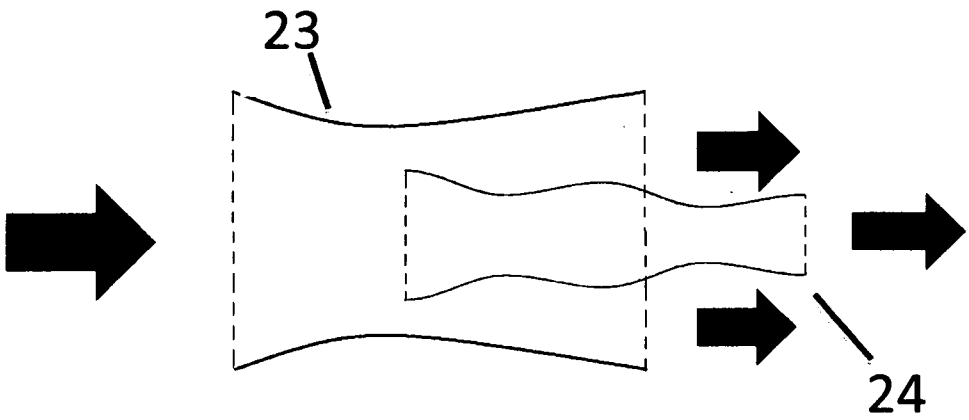


FIG. 5A

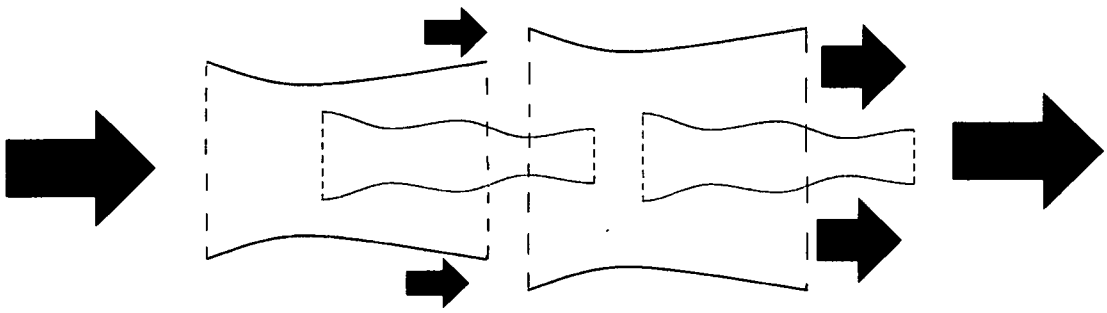

FIG. 5B

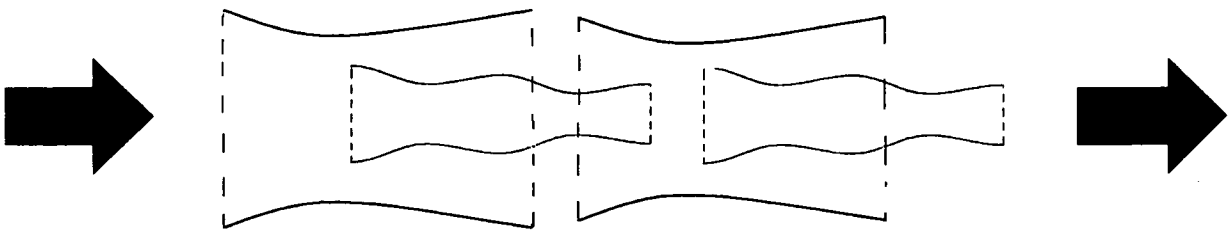

FIG. 5C

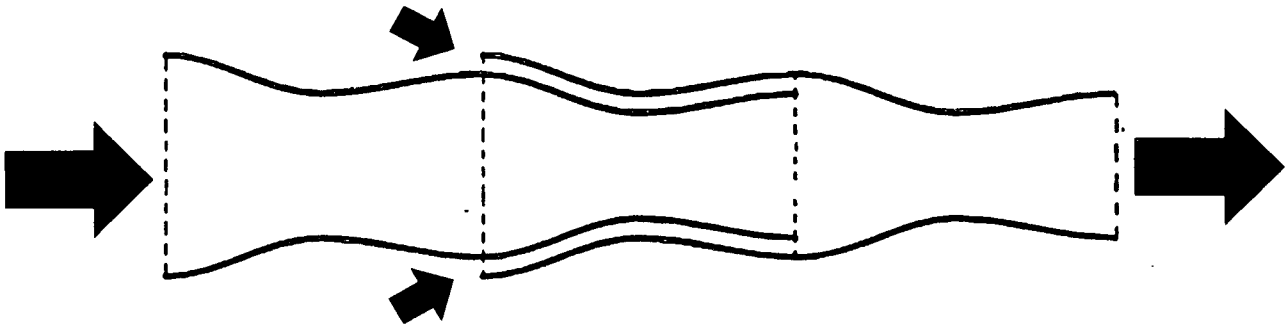

FIG. 6

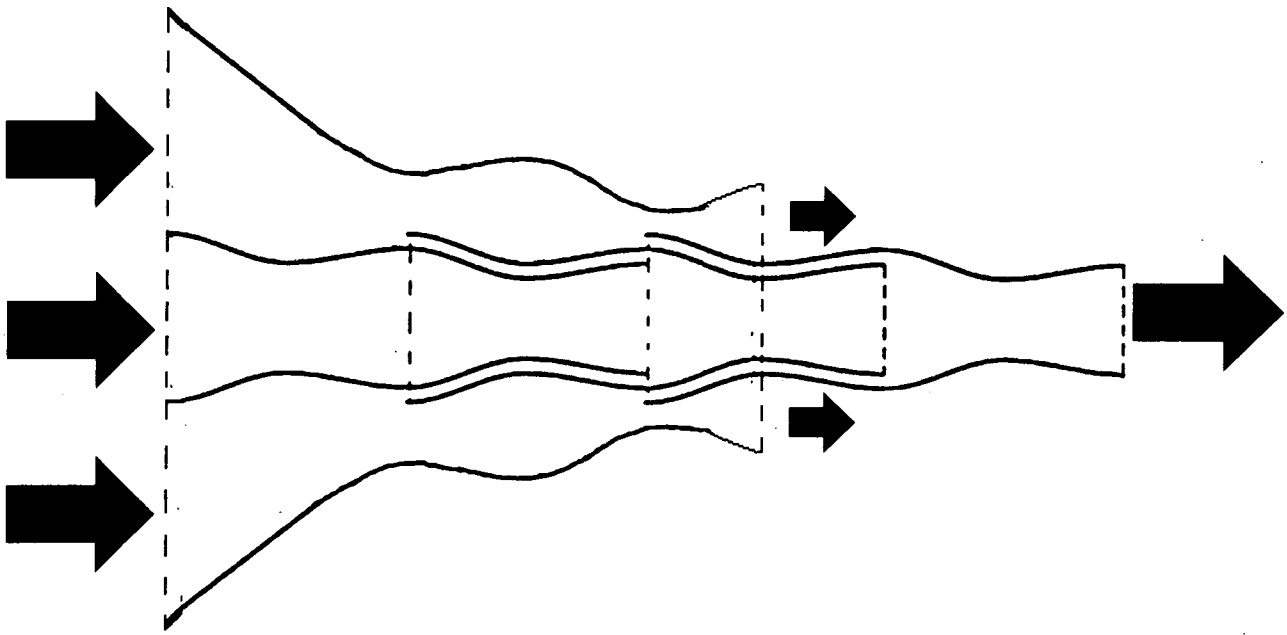

FIG. 7

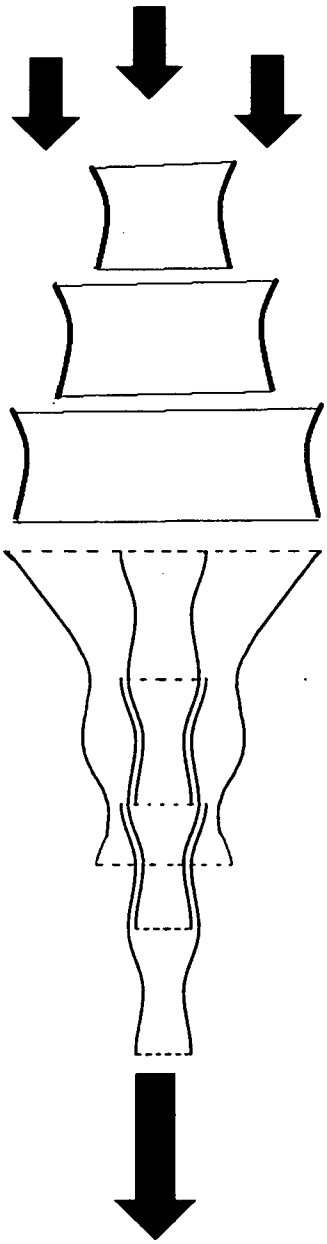

FIG. 8

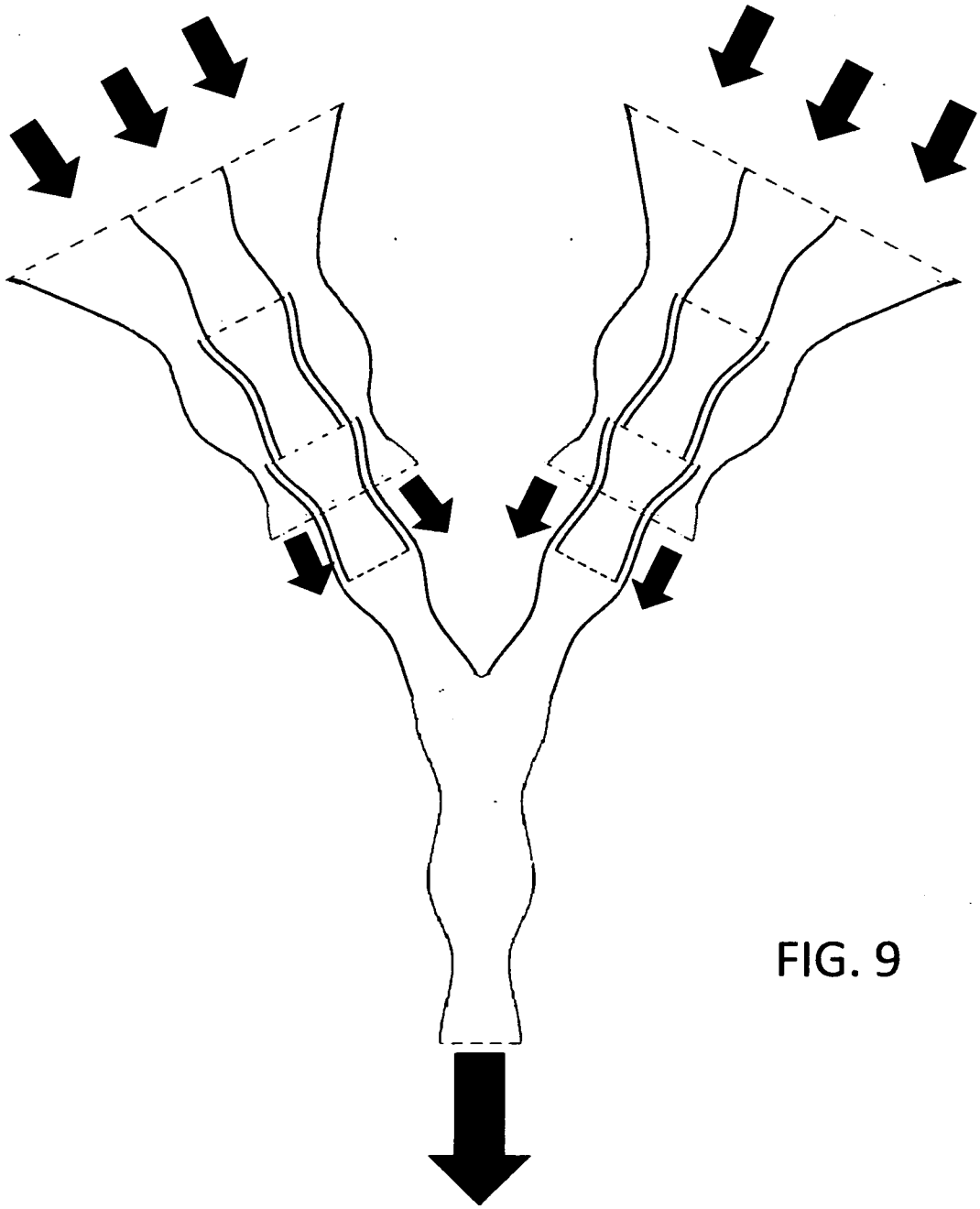

FIG. 9

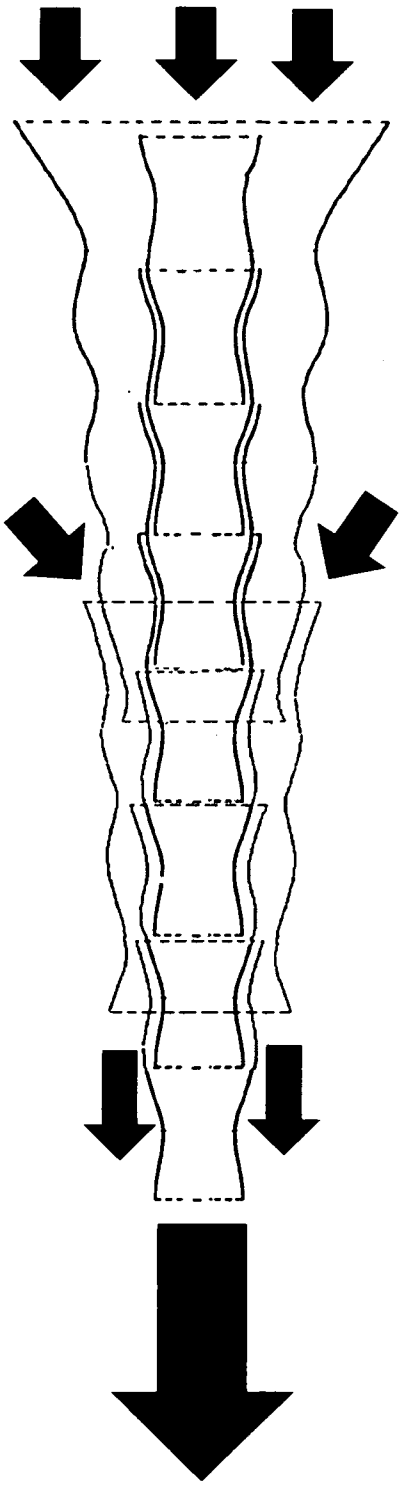

FIG. 10

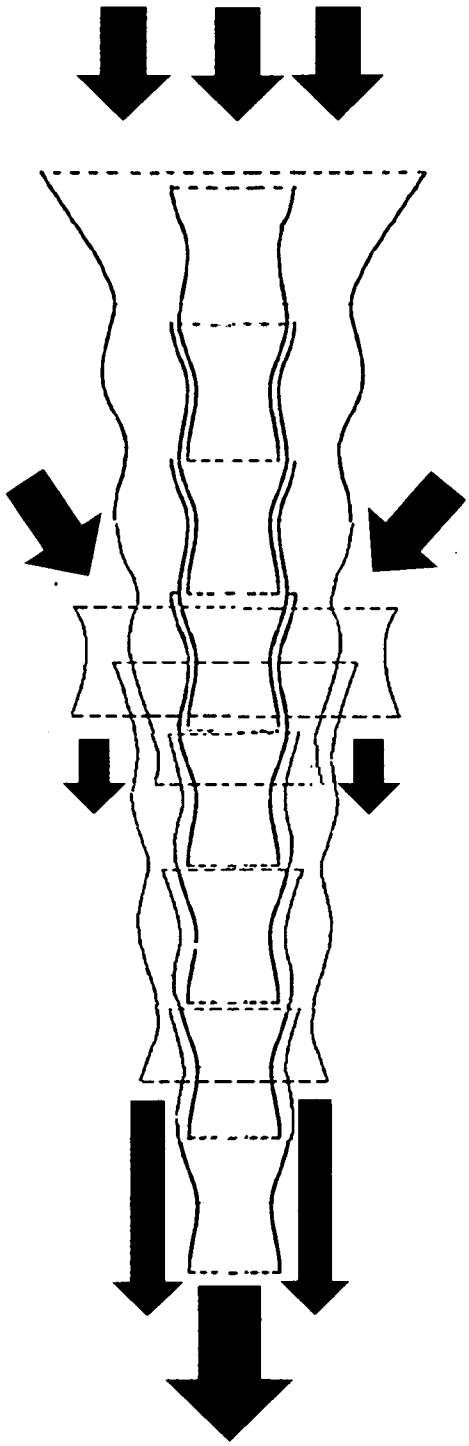

FIG. 11

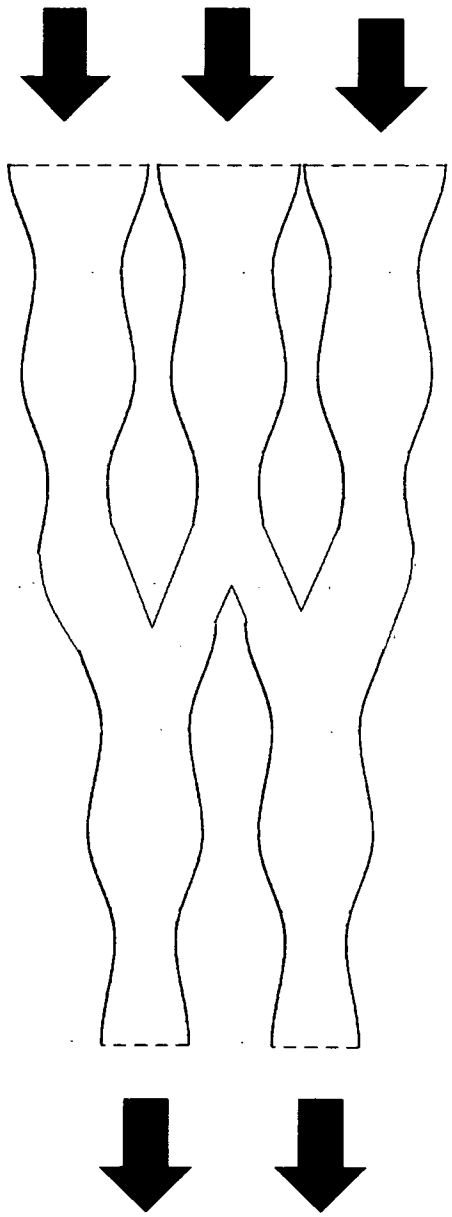

FIG. 12

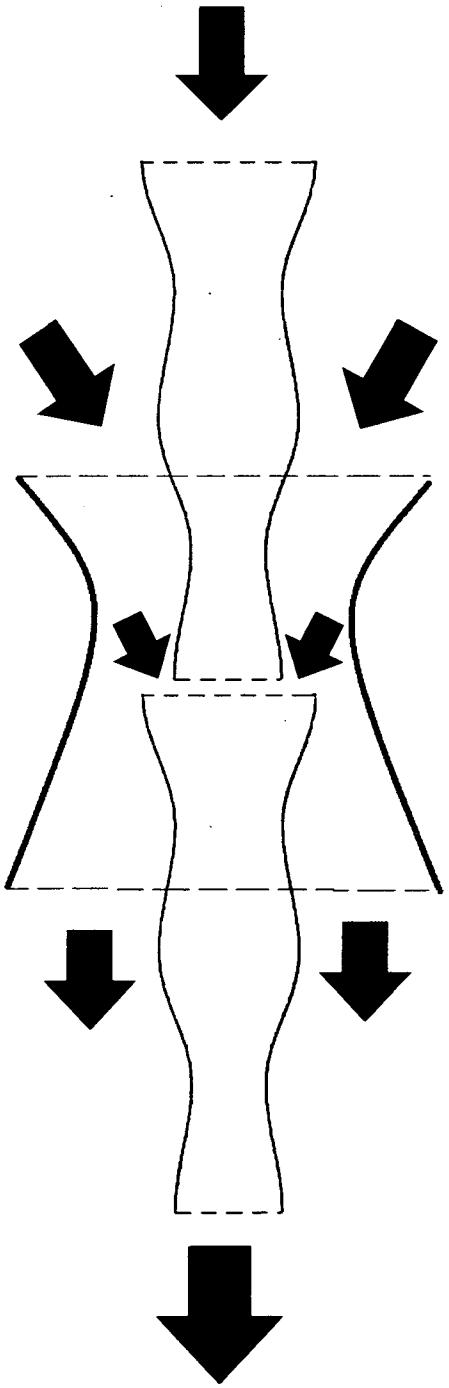

FIG. 13

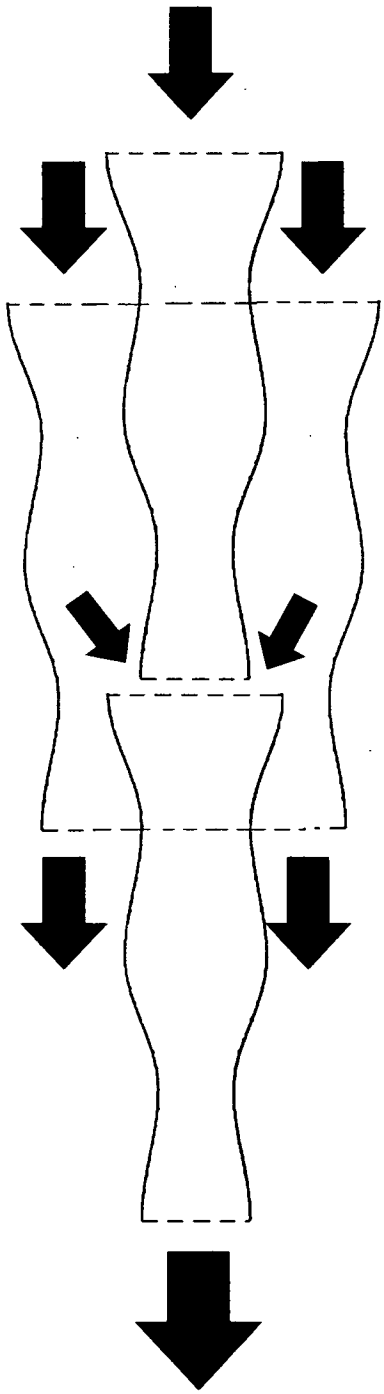

FIG. 14

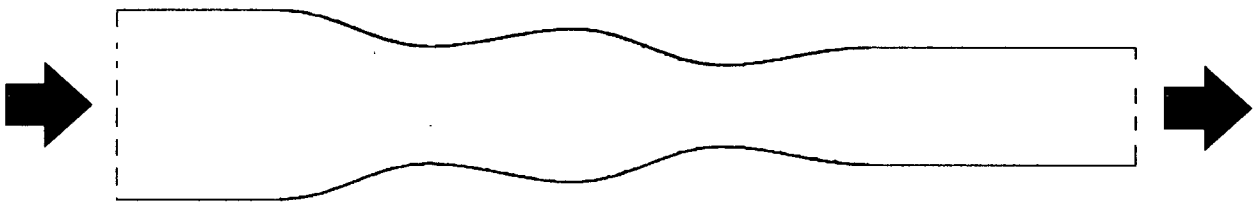

FIG. 15

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 12/00066

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G05D 11/00 (2012.01)
USPC - 137/115.11
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC:137/115.11

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC:137/502; G05D 11/00

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST:PGPB,USPT,EPAB,JPAB,DWPI,TDBD; Google Scholar
Search Terms: tunnel, funnel, duct, nozzle, chamb er, flow, mass, converging, diverging, turbine, pressure, speed, augment

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | US 6,139,241 A (Craig et al.) 31 October 2000 (31.10.2000) entire document; especially fig 2-4, 6, 7; col 3, ln 32 - col 4, ln 24. | 1-31 |
| Y | US 7,156,744 B2 (Metni et al.) 02 January 2007 (02.01.2007) entire document; especially fig 2. | 1-31 |
| A | US 975,248 A (Johnson) 08 November 1910 (08.11.1910) entire document. | 1-31 |
| A | US 4,055,003 A (Sack) 25 October 1977 (25.10.1977) entire document. | 1-31 |
| A | US 4,649,760 A (Wedding) 17 March 1987 (17.03.1987) entire document. | 1-31 |
| A | US 5,366,094 A (Stein) 22 November 1994 (22.11.1994) entire document. | 1-31 |

☐ Further documents are listed in the continuation of Box C. ☐

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"A" document defining the general state of the art which is not considered to be of particular relevance
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 13 May 2012 (13.05.2012) | 21 MAY 2012 |
| Name and mailing address of the ISA/US<br>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents<br>P.O. Box 1450, Alexandria, Virginia 22313-1450<br>Facsimile No. 571-273-3201 | Authorized officer:<br>Lee W. Young<br>PCT Helpdesk: 571-272-4300<br>PCT OSP: 571-272-7774 |

Form PCT/ISA/210 (second sheet) (July 2009)