Title of Invention :

"Boundary Layer Turbine Engine"

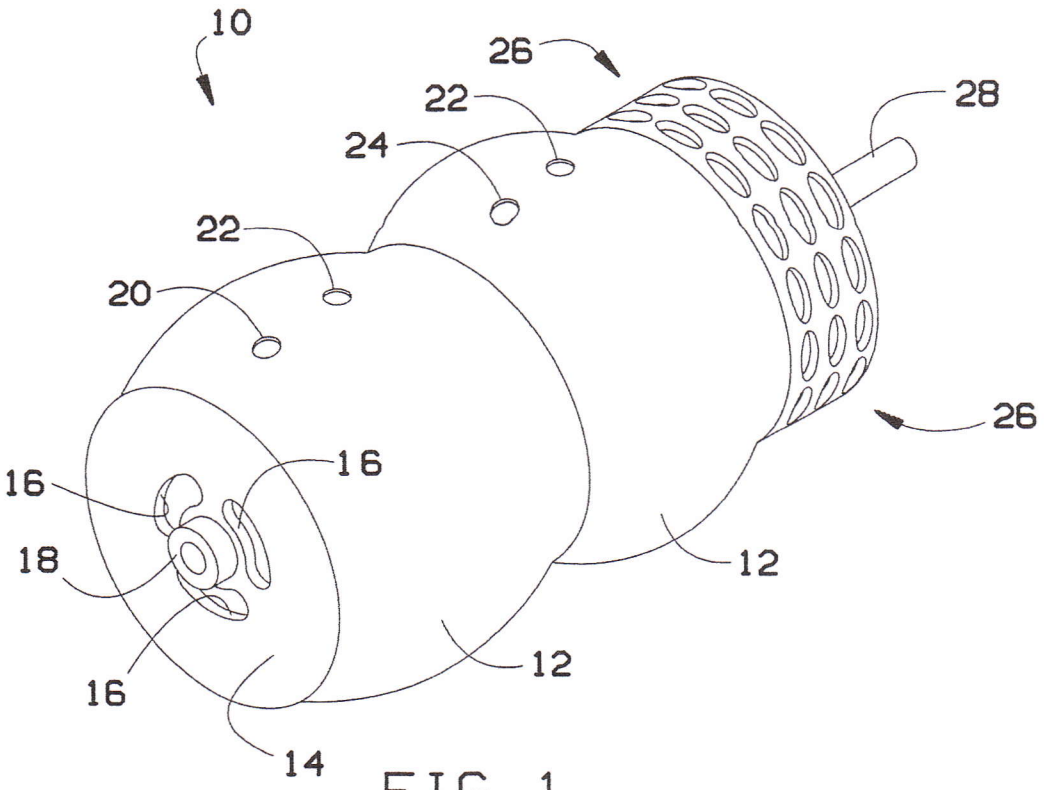
Drawing Description

Fig.1: *is a perspective view of the invention* ***10.***
Fig.2: *is a system diagram of the invention* ***10.***
Fig.3: *is a detailed view of the exhaust/power disk* ***30.***
Fig.4: *is a detailed view of the compression disk* ***32.***
Fig.5: *is a detailed view of the shaft mounted baffle disk* ***34.***
Fig.6: *is a detailed view of the star washer* ***40.***
Fig.7: *is a detailed section view taken along line* ***7-7*** *in* ***Fig.3.***
Fig.8: *is a cross section diagram of the invention* ***10.***
Fig.9: *is a cross section diagram of an alternate embodiment of the invention* ***10.***

Description List

10: *is the overall invention.* CUTAWAY SIDE VIEW
12: *is the containment jacket.*
14: *is the chassis front cover.*
16: *is the air intake.*
18: *is the bearing housing.*
20: *is the fuel injection port.*
22: *is the ignition port.*
24: *is the water/air/fuel injection port.*
26: *are the exhaust ports.*
28: *is the shaft.*
30: *is the exhaust/power disk.*
32: *is the compression disk.*
34: *is the shaft mounted baffle disk.* RED
36: *is the spacer bump.*
38: *is the concentric port.*
40: *is the star washer.*
42: *is the frictionless bearing.*

44: *is the shaft mounted labyrinth seal.* GOLD
46: *is the chassis mounted labyrinth seal.* SILVER
48: *is the fuel injector.*
50: *is the bubble chassis enclosure.*
52: *is the flame barrier.*
54: *is the igniter.*
56: *is the chassis mounted baffle disk.* BLUE
58: *is the fuel/water injector.*
60: *are the exhaust ports.*
62: *is the chassis rear cover.*
64: *is the shaft.*
66: *is the exhaust evacuation disk.* (SAME AS COMPRESSION DISICS)
68: *is the air intake.*
70: *is the air compression.*
72: *is the fuel injection.*
74: *is the ignition.*
76: *is the combustion.*
78: *is the exhaust/power flow.*
80: *is the exhaust evacuation.*
82: *is the power boost water/air injection.*
84: *is the water vaporization/air expansion.*
86: *is the exhaust/power flow.*
88: *is the exhaust evacuation.*
90: *is the outer port radius.*
92: *are the compressed air ports.*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26
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14

FIG. 1

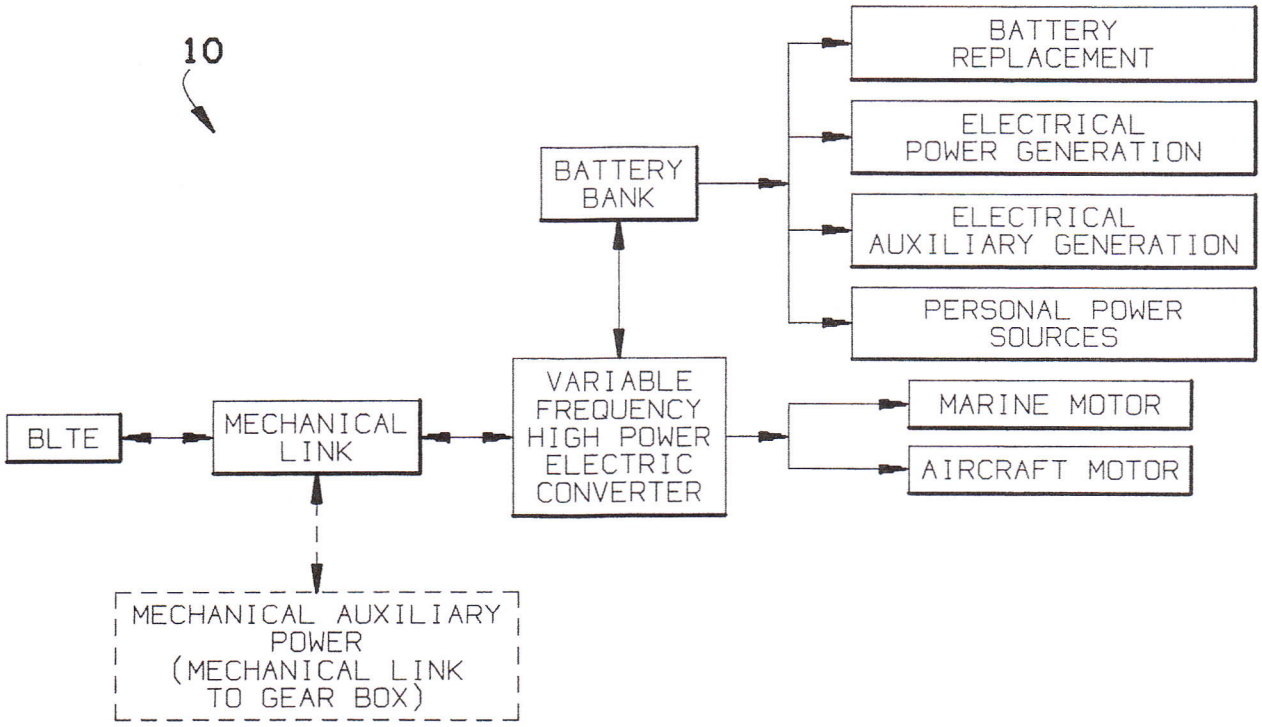
10
BATTERY REPLACEMENT
ELECTRICAL POWER GENERATION
BATTERY BANK
ELECTRICAL AUXILIARY GENERATION
PERSONAL POWER SOURCES
VARIABLE FREQUENCY HIGH POWER ELECTRIC CONVERTER
MARINE MOTOR
BLTE
MECHANICAL LINK
AIRCRAFT MOTOR
MECHANICAL AUXILIARY POWER (MECHANICAL LINK TO GEAR BOX)

FIG. 2

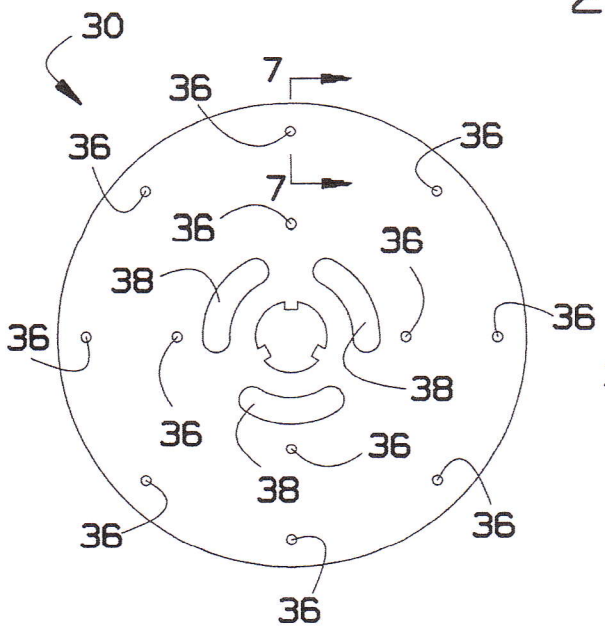

FIG. 3

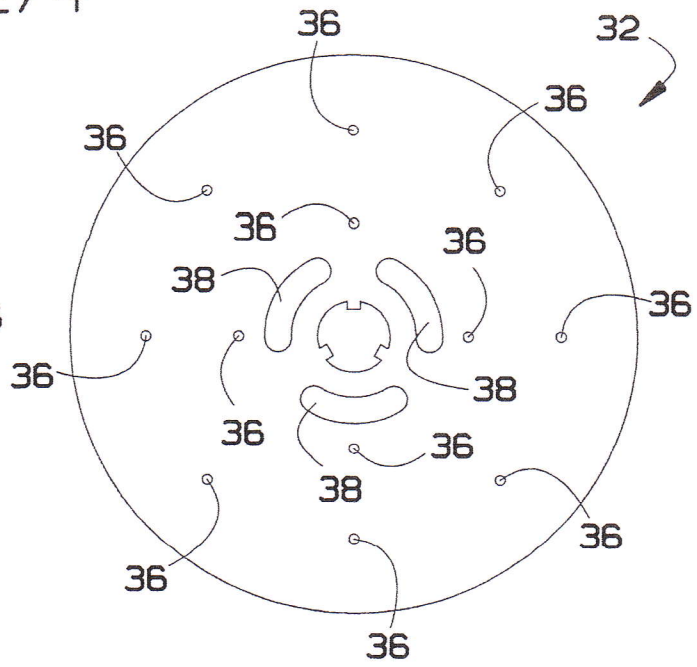

FIG. 4

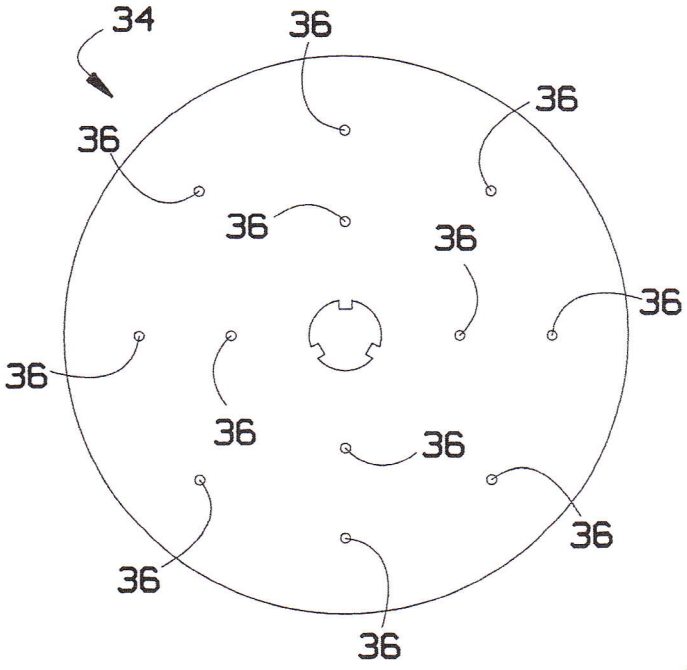

FIG. 5

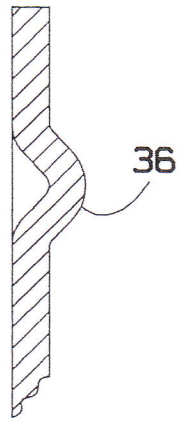

FIG. 7

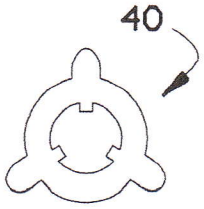

FIG. 6

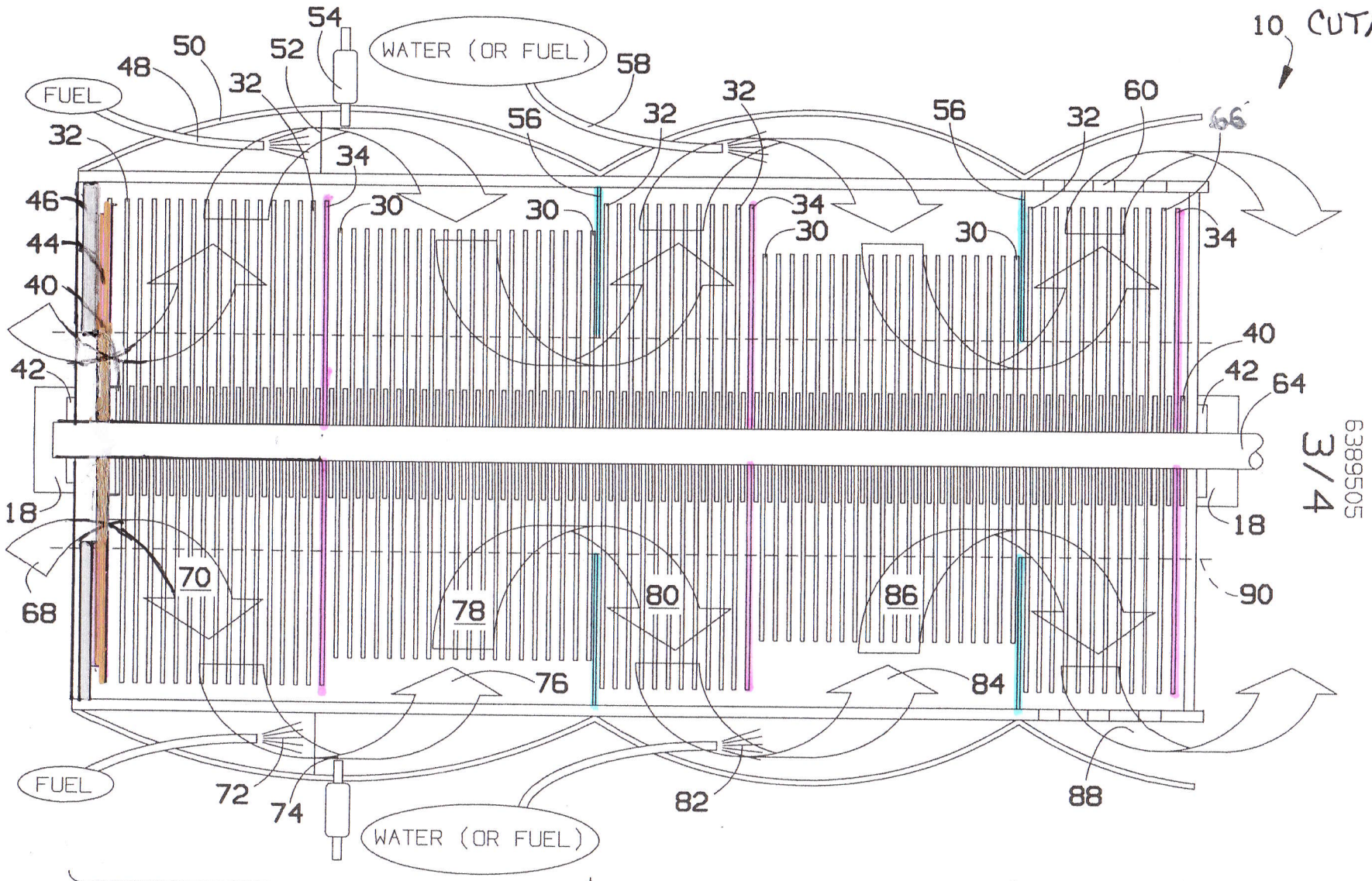

FIG. 8

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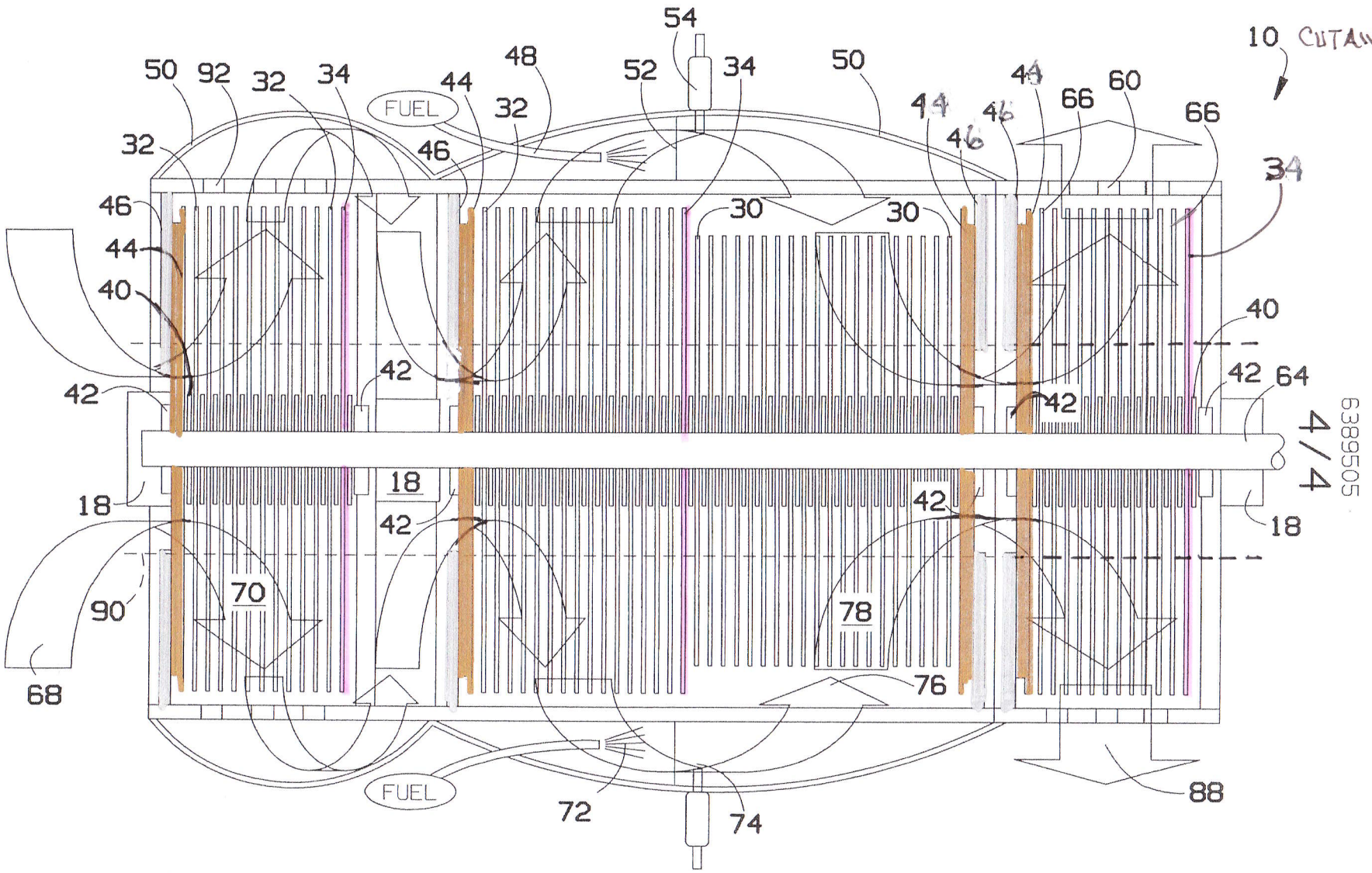
10 CUTAWAY SIDE
54
50
92
32
34
48
52
34
50
44
66
60
66
FUEL
32
46
32
46
46
34
30
30
44
40
40
42
42
42
64
42
4/4
6389505
18
18
42
42
18
70
90
78
68
76
FUEL
72
74
88
PRE AUXILIARY STAGE
BLTE ENGINE STAGE
POST AUXILIARY STAGE

FIG. 9

Internal Combustion Boundary Layer Turbine Engine (BLTE)

DESCRIPTION

[Para 1] This invention relates to a high speed radial flow turbine engine which operates on a multitude of fuels and can replace all reciprocating and radial turbine applications and more. This application can be configured as a single or multi-staged modification of a previous external combustion design.

[Para 2] The device is comprised of the following:

- Stage Description: 1.) Three types of flat disks typically with center ports. 2.) An intake seal disk which incorporates a seal mechanism that with a complimentary seal on the opposite case wall, prevents the escape of pressurized gasses. 3.) A compressor section of disks limited by a baffle disk with no center port. 4.) A combustion chamber into which fuel is injected, a flame barrier to maintain ignition and an electrical igniter (or other igniter type) by which combustion is initiated and. 5.) A series of ported disks which extract the energy of combustion and exhaust the working gasses (fluid) via the center ports. Additional stages are only limited by the availability of working heat and/or available expandables and combustibles. Additional stages will enhance engine power and/or efficiency.
- Auxiliary Stages: 6.) An additional pre-stage(s) can be concatenated to the above described BLTE Stage(s) with the additional capability of air compression. 7.) The additional post-stages evacuate or redirect the working fluid stream.

[Para 3] All components described previously in terms of a "stage" are necessary for the operation of this engine. Multiple stages are optional, other expansion gasses are optional, the variable speed shaft is optional and the generator output device is optional in lieu of a mechanically geared output. Any of the optional devices would improve the

operation of this engine. The addition of an electronic engine controller (ECM) would greatly augment engine operation and enhance applications.

[Para 4] Simple and standard manufacturing tools are necessary to produce the BLTE which is one of the main points of its desirability. Otherwise centering and balancing tools with high speed and high temperature bearings are necessary for correct operation. Such devices are commonly used in the production of standard turbine engines and turbo compressors for reciprocating engines.

[Para 5] The relative sizes of the compression disks to the smaller but more numerous power disks as shown are primarily responsible for the working fluid flow, essential for engine operation and "imposes the path of least resistance".

[Para 6] All disks are positioned on a single shaft (the shaft may incorporate variable speed sections) where the compressor disks provide air intake into the combustion/expansion chamber. The baffle disk(s) define the boundaries of the compression functions, power functions and confines the BLTE stages. The exhaust disks extract energy from the working fluid (combustion gasses) and exhaust those gasses through the center ports to the next stage if any.

[Para 7] As the disk assembly is rotated, air is inducted and compressed due to drag and centrifugal forces. After combustion and expansion the combusted gas (working fluid) is exhausted through and across the exhaust disks and ultimately out of the center ports. The forcing of the working fluid in a decreasing radius through to the center ports of the exhaust disk array extracts the energy of the combusted gasses and delivers that energy to the center shaft (drive shaft).

[Para 8] Other Boundary Layer Turbine Engines (BLTE) are implemented as single stage device converters using singular disk sizes and types that are typically powered from an external combustion source. My invention incorporates internal combustion in a single stage which may also be arranged in multi-stages where each stage provides intake, compression, combustion or expansion and exhaust with a single moving disk assembly imposing efficiency of the working fluid flow.

[Para 9] My invention incorporates multi-stages arranged as complex (single chassis stages) or compound (multiple chassis stages) where a single stage provides intake, compression, combustion and exhaust with a single moving part and relatively low working fluid flow. The advantage modification for various applications.

[Para 10] This invention can be used in place of any reciprocating engine application (automotive, airspace, marine, power tools, and many battery applications).

What is claimed is:

[Claim 1] A high speed flat bladed radial flow turbine engine which operates on a multitude of fuels and replaces all reciprocating and radial turbine engine applications and provides many more.

[Claim 2] Relative disk sizes for internal compression (larger) and exhaust (smaller) functions provide working fluid flow directionality.

[Claim 3] Disk spacing will determine working fluid flow capacity and ultimately power output. Engine speed and power output is thereby a function of air intake and fuel metering.

[Claim 4] Less internal friction than a piston driven reciprocating engine and a reduced and less disturbed flow of working fluid than in a conventional radial flow turbine engine which means greater efficiency than either.

[Claim 5] This application will accommodate a single or multi-staged configuration.

[Claim 6] Auxiliary or sub-stage components provide additional compression or exhaust handling.

[Claim 7] The single moving part (assembly) reduces maintenance and limits wear and stress to the bearings which support the moving assembly.

[Claim 8] The BLTE naturally lends itself to scalability from the very small to the very large applications.

[Claim 9] An electronic engine controller or electronic control module will manage engine functions and impose application requirements.

ABSTRACT

My invention provides scalable power (high, medium or low) outputs and provides these outputs at approximately three times the efficiency of a reciprocating engine or a radial turbine engine. My invention offers simple and inexpensive construction with commonly available machine tools. My invention offers the light weight and high power output capability of continuous burn engines. My particular application solves the problem of internal combustion and multi-stage operation for this particular new category of engine.