HYDRODYNAMIC CLOSED LOOP TURBOSET-SELFBOOSTER

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ABSTRACT

The Hydrodynamic closed loop turboset-selfbooster comprises one or more axial bispinde multistage hydraulic turbines (20A, 20B) placed into a common closed-loop tubular tunnel (26S) with an axial-flow propeller pump (27) which works in self-series, as a self-booster impelling high potential operating liquid, filled inside the tunnel. The natural accumulative turbotechnology provides high energy ratio and thus profound general efficiency. The proposal leads to: (a) wide range of universal power units including perfect hydraulic turbines and effective motors for vehicles and other means instead of ineffective heat engines, (b) prospective gradual elimination of fuels for many kinds of power units, (c) ecological purity without any harm emissions and pollutions, (d) multiple high efficient design versions of different power levels, various performances and diverse purposes.
HYDRODYNAMIC CLOSED LOOP TURBOSET-SELFBOOSTER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Provisional Patent Application No. 60/709,444 filed Aug. 19, 2005 by present inventor.

FEDERALLY SPONSORED RESEARCH

[0002] Not applicable.

SEQUENCE LISTING OR PROGRAM

[0003] Not applicable.

BACKGROUND OF THE INVENTION

Technical Field; Prior Art

[0004] This proposal relates to hydrodynamic and electromechanical structures which provide effective accumulating energy transfer especially to universal motors and turbines. Conventionally there are known heat engines and turbines widely used in motor vehicles and other moving and static power sets. A common principal defect of most of them is their low about 40% total efficiency. Their imperfect general technology leads to power wasting, large and costly fuel consumption, and non-prospective burning out their combustibles.

[0005] These conventional heat engines and some turbines are ineffective because of high energy dissipating. They pollute the nature and carry huge costs to end users. The most of them literally squander and through out more than a half of energy they have produced.

[0006] This proposal provides effective energy transfer with cyclical energy accumulation and high power ratio based on clean natural technology. The subject matter of this turbotechnology are axial bispindle multistage hydrodynamic turbines with primary and guiding wing-blade stages connected to their contrary rotating spindles—all installed inside closed liquid tunnels with an axial-flow propeller pump working as self-booster for itself and for turbines, accumulating energy cyclically by and in the potential operative liquid flow in the said tunnel.

[0007] These developed solutions turn the turbosets into effective motors and/or turbines and/or independent power units for diverse purposes.

[0008] Any direct prior arts connected with my proposal or some analogies were not found. The initial prior art ideas of this cyclical technology were gifted by our Mother Nature. My general circuit—self-boosting method is similar to human and mammal cordial systems philosophically.

[0009] Some fragmentary elements of testing closed fluid dynamic tunnels could be regarded like a far prior art details but these tunnels had never even been considered as a possible base for redeveloping into power units despite their formal high energy ratio.

[0010] This proposal unites, combines and develops further some of technological particularities of:

[0011] closed testing wind and water tunnels,

[0012] fluid dynamic axial multistage turbines

[0013] Hydrodynamic transmissions general flexibility.

BRIEF SUMMARY OF THE INVENTION

[0014] It is an object of this proposal to provide a real effective universal power set based on accumulative low-power-dissipating technology.

[0015] It is another object of this proposal to provide clean natural technology without any pollutions and other harm emissions.

[0016] It is another object of this proposal to provide multiple power and design versions of effective clean motor sets to meet any of application requirements.

[0017] The nature and substance of hydrodynamic closed loop turboset-selfbooster and turbotechnology are axial multistage bispindle concentric turbines installed inside closed loop tubular tunnel with an axial-flow propeller pump which, impelling the operative amount of liquid filled into tunnel,—works as a self-booster for itself and for all the turbines.

[0018] The said axial-flow propeller pump working actually in self-series accumulates the energy of the operative liquid, rising the pressure cyclically up to definite level—by design. The turbines, working in high potential liquid flow, develop needed level of energy and can drive various receivers of their power like electric generators, shown in present embodiment or others—alternators and/or mechanical transmissions.

[0019] This accumulative and low-dissipating turbotechnolgy provides high energy ratio by self-boosting axial-flow propeller pump working in self-series; bispindle axial multistage wing-blade turbines; a closed-loop common tunnel having inside the high-potential operative liquid flow with its cyclical energy replenishing and smooth hydrodynamic interactions. The turbotechnology is natural, clean, has no pollutions, harm emissions and substantial energy dissipating losses.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] In the drawings closely related units and/or sub-units have the same numbers but different alphabetic suffixes. The wire connections are not shown as obvious and well known.

[0021] FIG. 1 shows a side view of Hydrodynamic closed-loop turboset with a singular axial concentric-bispindle turbine.

[0022] FIG. 2 shows a side view of similar but cascade-type Hydrodynamic closed-loop turboset with two axial concentric-bispindle turbines installed in series.

[0023] FIG. 3 shows a cross section taken on 3-3 of FIG. 1.

[0024] FIG. 4 is a plan view 4 of Hydrodynamic closed-loop turboset of FIG. 1.

[0025] FIG. 5 is a schematic cross section taken on 5-5 of FIG. 3.

[0026] FIG. 6 is a fragment 6 of FIG. 3; shows a partial side section of both turbine spindles and their primary and guiding blade stages.
REFERENCE NUMERALS AND SYMBOLS IN DRAWINGS

[0027] 20A—Axial bispindle hydroturbine
[0028] 20B—Head axial bispindal hydroturbine
[0029] 21—Inner turbospindle
[0030] 21A Primary wing-blade
[0031] 22—outer turbospindle
[0032] 22A—Guiding wing-blade
[0033] 22B combined drive-brake
[0034] 22G—guard
[0035] 23—Head double bearing
[0036] 24Aft double bearing
[0037] 25—Wing blade control
[0038] 26A—Closed loop tunnel
[0039] 26B—Closed loop cascade tunnel
[0040] 26C—cavitation control valve device
[0041] 26D—bypass
[0042] 26E—Tunnel air-cooler
[0043] 26S—flow straightener
[0044] 26V—visor
[0045] 27—axial-flow propeller pump
[0046] 27A—pump’s electric motor
[0047] 27B—pump transmission
[0048] 28A, 28B, 28C—electric generators
[0049] 28D—electric battery and charger set
[0050] 29F, 29G, 29H

High potential operative liquid flow

[0051] 29G—meters, control
[0052] “S” adjacent wing-blade stages step-spacing
[0053] 29A

bypass valve

[0054] operative liquid
[0055] spindle’s rotation
[0056] subunits axises
[0057] rotating or static outer turbine’s spindle

DETAILED DESCRIPTION OF THE INVENTION

[0059] The FIGS. 1, 2, 3, 4, 5, 6 show the preferred embodiments and arrangements of the present proposal its units, subunits, and their interactions.

[0060] A hydrodynamic closed loop turboset-selfbooster, its turbotechnology as illustrated in FIG. 1 includes at least an axial bispindle hydroturbine 20A installed into closed loop tubular liquid tunnel 26A with an axial-flow propeller pump 27. The definite amount of operative liquid which is completely filled into said tunnel is preferably a high density operative liquid under definite controlled static pressure. The hydroturbine 20A being bispindle drive two electric generators 28A and 28B by each spindle and could drive any other receivers of turbine’s power in other designs. The turboset has a tunnel air-cooler 26E placed near cooling fans of the tunnel 26A, a kit of needed hydraulic and electric meters and general control panel 29G.

[0061] Another, a cascade embodiment of this proposal is hown in FIG. 2 where two axial bispindle hydroturbines 20A and 20B installed into their common closed loop cascade tunnel 26B. Also the electric generators 28A, 28B, 28C, pump 27 and pump’s electric motor 27A, air cooler 26E, cavitation control valve device 26C are shown in FIG. 2.

[0062] The FIG. 3 illustrates the general design and technological structure of the said axial bispindle hydroturbine 20A, which includes:

[0063] (a) an inner turbospindle 21 rotating with its primary wing blade stages 21 when operating,

[0064] (b) outer turbospindle 22 generally rotating with its guiding wing-blade stages 22A when operating; both said spindles 21 and 22 are coaxial each to other,

[0065] (c) head double bearing 23,

[0066] (d) aft double bearing 24,

[0067] (e) wing blade adjusting control 25.

[0068] Any of guiding wing blade stages 22A has two adjacent primary wing blade stages 21A along their spindles respectfully.

[0069] The numbers of any blades in any stage 21A and 22A, the number of stages on both spindles 21 and 22 accord to specific designs.

[0070] The said wing blades 21A and 22A may be mono- and/or multi-element, and/or have slotted flaps, slats, flexible trailing edges.

[0071] The wing-blade-stage-spindle-turbine design includes and provides:

[0072] (f) correct guiding when operative liquid flow is waving between adjacent of both spindles blade stages 21A and 22A.

[0073] (g) needed hydrodynamic conditions for both said turbospindles 21 and 22 to rotate in opposite directions.

[0074] (h) obtaining maximum torque on both turbospindles 21 and 22 in their optimal revolutions,

[0075] (i) preventing extra-turbulence of liquid flow of 29F in order to protect the cyclical accumulation of pressure in high potential flow 29F.

[0076] The FIG. 4 shows the plan view of turboset: directions of rotations of primary wing blades 21A and guiding wing-blades 22A according to the liquid flow 29F in the tunnel 26A; turbine 20A electric generator 28A; tunnel 26A; cavitation control valve device 26C.
The combined drive brake of the outer turbo spindle 22 can be used to make the outer spindle 22 with its guiding wing blades 22A static in some cases if needed.

The FIG. 5 is a schematic section of hydro-turbine 20A with both concentric spindles 21 and 22, primary and guiding blade stages 21A and 22A, blade controls 25.

The symmetrical and concentric placement of wing-blades 21A and 22A, exemplary number of blades in their stages, opposite spindles' rotations in moving high potential liquid flow 29F in regular order of work are shown.

The fragmentary cross sectional view of FIG. 6 shows how the primary wing-blade 21A, guiding wing-blade 22A, adjusting wing-blade control 25 are placed on their inner 21 and outer 22 turbospindles respectfully each other and fluid flow 29F. The average adjacent wing-blade stages spacing “S” is shown.

FIGS. 1, 2, 3 illustrate also where are flow straighteners 26S which provide needed turbulence limitation and volume equalization of the high potential flow 29F caused by dynamic state of operating liquid inside the tunnels 26A and 26B double bearing 23, 24. The visor 26V is used for visual observation of high potential liquid flow 29F when the cavitation control valve device 26C is tuning.

Combined Operation and General Interactions

The axial-flow propeller pump 27 driven by its electric motor 27A, working in series with itself and for itself as selfbooster inside hydraulically closed loop tunnels 26A or 26B impels the operative liquid. The pressure of said liquid rises from cycle to cycle up to a definite level forming inside said tunnels a stable high potential flow 29F which drives the axial concentric bispindle multistage hydrodynamic turbines 26A, 26B.

The adjusted by controls 25 wing blades 21A, 22A provide needed hydrodynamic lift forces in their stages for turbines spindles 22 and 22 forming their torques to drive electric generators 28A, 28B, 28C and obtain their power—all together and/or separately.

The orientation of wing blades in their adjacent primary 21A and guiding 22A stages forces the said flow 29F to wave between adjacent stages of wing blades and rotate the spindles 21 and 22 in opposite directions in regular working regime, in most cases.

The hydrodynamic design of all wing blades in all stages 21A and 22A, regular contrary rotation of both spindles 21 and 22, correct numbers of wing blades in any stage, spacing “S” between adjacent stages, appropriate velocities of the liquid and spindles’ revolutions make the potential flow 29F smooth, correctly directed between any adjacent blade stages 21A and 22A without extra rumpling and messing of the flow 29F. This leads to the designed level of energy conservation of the high potential flow 29F after each wing-blade stage 21A and 22A. That is why the turbotechnology of this proposal is accumulative without big dissipations of energy.

In some cases often connected with starts and stops of turbosets' work, the guiding blades 22A and their spindles 22 can be static by control of the brake-part 22B if needed.

The adjusting wing blade controls 25 provide regulation of general orientations to any of primary and/or guiding wing blade 21A, 22A in order to have appropriate hydrodynamic angles of attack and downwash between any adjacent wing blades, respectively to liquid flow 29F direction and spindles rotations.

Limitations of possible extra vortices in multiple wing-blade rotative interactions needed regulation of any local wavings of fluid flow 29F between adjacent wing blades in order to make the flow 29F transfer from any blade stage to adjacent stage as smooth as possible thus supporting the general accumulating technology inside the tunnels 26A, 26B.

The tunnels 26A, 26B can be filled by various liquids with relatively high density such as various kinds of salt water, organic solutions, bromides, heavy anti-freezes—if needed and designed for specific conditions. The sum volume and initial increased static pressure of the operative liquid inside the tunnels 26A, 26B correspond and depend on type and particularities of liquid and pump 27.

The possible local cavitation of liquid flow 29F is limited suppressed and/or depressed in regulation by pressure control valve-device 26C with springed piston which can provide the initial calculated static pressure of operative liquid in the tunnels 26A, 26B for specific design versions.

The total power of all driven electric generators 28A, 28B, 28C (or other energy receivers) is the common power of the hydrodynamic closed loop turboset, as a motor unit. The initial and operational power for pumps 27 electric motor 27A and air cooler 26E can be provided by any of electric generators 28 with usage of matching electric battery and charger set 28 control 29G.

The hydrodynamic closed loop turboset-selfbooster operates as ecologically clean motor unit based on natural turbotechnology which has no harm emissions and/or pollutions. The power ratio and common effectiveness are high in multiple design versions including various series and parallel schemes of turbosets with equal or different power levels.

Calculated Approaches, Basic Formulae

Hydrodynamic lift force \( L_w \) of any singular wing-blade

\[
L_w = C_L \cdot \frac{p}{2} \cdot \frac{\upsilon^2}{S_w} \cdot [kgf],
\]

where

- \( C_L \) — Lift coefficient,
- \( p \) — high potential liquid density,
- \( \upsilon \) — velocity of liquid flow in the turbine,
- \( S_w \) — working surface of the wing-blade.

Total turbines’ rotating spindles torque:

\[
\Sigma T_r = Z \cdot \eta \cdot w \cdot n \cdot R_{av} \cdot [kNm],
\]

where

- \( Z \) — numbers of wing blades in stages of turbines,
- \( \eta \) — spindels’ efficiency,
- \( R_{av} \) — average radii.
where
\[ \omega_{sp} \] — rotation speeds of spindles; \[ \eta_t \] — turbines efficiencies.

(4) Power of axial-flow propeller pump

\[ P_p = \frac{Q \cdot (\Sigma H + \Sigma D_s \cdot u_r) [W]}{10^2 \cdot \eta_p} \]

where \( Q \) — pump capacity [m³/sec], \( \Sigma H \) — the sum of the pressure losses: frictional along the tunnel, local, additional dynamic and static losses [Kg/m²], \( \Sigma D_s \) — Hydrodynamic wing-blade stages drag

\[ \Sigma D_s = (C_d \times Z_b \times \frac{C_f}{C_d}) [Kg] \]

where
\[ C_d \] — drag coefficient; \( \eta_p \) — pump efficiency.

(5) turboset power ratio or coefficient of performance:

\[ TPR = \frac{\sum P_T [kw]}{P_{pump} + P_{air cooler} [kw]} \]

What is claimed is:

1. A Hydrodynamic closed loop turboset-selfbooster comprising at least one of axial concentric bispindle multistage hydraulic turbines placed inside a closed loop tubular tunnel with an axial-flow propeller pump impelling operative liquid filled inside said tunnel to drive said turbines.

2. The turboset of claim 1 wherein said turbines include primary wing-blade rotating stages connected with inner turbospindle and guiding wing-blade generally rotating stages connected with outer tubular turbo-spindle, which is concentric to said inner turbo-spindle.

3. The turboset of claim 2 wherein said primary wing blades and said guiding wing-blades can be one-piece and/or multi element, and/or combined in stages, and/or spindles, and/or turbines.

4. The turboset of claim 2 wherein any of said primary and guiding wing-blade stages may include various and different numbers of wing-blades and the average adjacent blade stage step-spacing along said spindles can be different depending on turbine design.

5. The turboset of claim 2 wherein any of said guiding stages is placed between said primary stages along their said spindles and mutual orientation of primary and guiding stages provide the opposite rotations of said inner and outer spindles.

6. The turboset of claim 1 wherein said closed loop tubular tunnel is filled with a preferably high density operative liquid under definite controlled static pressure.

7. The turboset of claim 6 wherein said closed loop tunnel and its elements include flow straighteners for high potential flow turbulence limitation and flow equalization.

8. The turboset of claim 6 wherein said closed loop tunnel include a static pressure control valve device having a springed regulated piston.

9. The turboset of claim 1 wherein said closed loop tubular tunnel may include at least one controlled hydraulic bypass.

10. A hydrodynamic closed loop accumulative turbotechnology includes working as self-booster in series with itself, in pressure-accumulating manner, an axial-flow propeller pump which drives a kit of axial concentric bispindle multistage turbines by high potential flow, all in common closed loop tubular tunnel filled with operative liquid.

11. The turbotechnology of claim 10 wherein any of said turbines has two concentric spindles rotating in opposite directions.

12. The turbotechnology of claim 10 wherein the possible cavitation of said high potential flow in said tunnel is limited, adjusted, and controlled by valve device and/or partly bypassing said flow, and/or combining.

13. The turbotechnology of claim 10 wherein said closed loop turboset comprises an air-cooler placed near cooling fins.

14. The turbotechnology of claim 10 wherein the power of said turbines and/or spindles can be directed preferably to electric generators, alternators and/or other various power receivers.

15. The turbotechnology of claim 14 wherein said electric generators can drive the motors of axial pump air-cooler of the tunnel said in claim using regular electric battery and charger set.

16. The turbotechnology of claim 10 wherein said in claim 1 sets can work in series, in parallel, and/or combining in equal and/or different power levels

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