CLAIMS

1. A retrofitting method for a ship propulsion system,
wherein the ship propulsion system comprises at least one internal combustion engine with
a combustion chamber for burning a fuel;
an intake tract for supplying fresh air to the combustion chamber; and
a turbocharger with a compressor in the intake tract;
the method comprising:
connecting an electrolysis device configured to produce hydrogen and oxygen gas to a pressure side of the compressor for supplying hydrogen and oxygen gas into the intake tract; and
connecting a water tank and an alcohol tank to a pressure side of the compressor for supplying water and alcohol into the intake tract.

2. A ship propulsion system comprising:
at least one internal combustion engine with:
a combustion chamber for burning a fuel;
an intake tract for supplying fresh air to the combustion chamber; and
a turbocharger with a compressor in the intake tract;
an electrolysis device for producing hydrogen and oxygen gas for the internal combustion engine; and
an alcohol tank for supplying alcohols to the internal combustion engine;
a water tank;
wherein the water tank and the alcohol tank are connected to a pressure side of the compressor for the supply of water and alcohol into the intake tract, and
wherein the electrolysis device is connected to the pressure side of the compressor for supplying hydrogen and oxygen gas into the intake tract.

3. The ship propulsion system as defined in claim 2, wherein the water tank and the alcohol tank are connected to the pressure side of the turbocharger via a mixing container, and

the ship propulsion system further comprises a pressure pump between the mixing container and the pressure side of the turbocharger that is configured to generate a pressure that is higher than a pressure of the compressor.

4. The ship propulsion system as defined in claim 3, further comprising:

a control unit configured to:

set a water-alcohol mixing ratio in the mixing container in a variable manner,

variably set a ratio between the electrolysis gases and water and alcohol supplied to the internal combustion engine,

wherein the control unit comprises a data interface for receiving a fuel signal which indicates what kind of fuel is being supplied to the internal combustion engine; and

wherein the control unit is configured to vary the ratio between the electrolysis gases and water and alcohol depending on the fuel signal.

5. The ship propulsion system as defined in claim 4, further comprising:

an exhaust-gas temperature sensor,

wherein the control unit is configured to vary the ratio between the electrolysis gases and water and alcohol depending on an exhaust gas temperature, in particular to add more alcohol and water in the event of a higher exhaust gas temperature.

6. The ship propulsion system as defined in claim 4, further comprising:

a charge-air cooler

wherein the control unit is configured to control a cooling output of the charge-air cooler inversely to an amount of alcohol and water added on the pressure side of the turbocharger.

7. The ship propulsion system as defined in claim 3,

wherein:

the electrolysis device is designed in a manner that the hydrogen gas and oxygen gas are conveyed via separate electrolysis gas lines, and

the control unit is also configured to variably set a ratio between the hydrogen gas and oxygen gas supplied to the internal combustion engine.

8. The ship propulsion system as defined in claim 3, further comprising:

a water-alcohol supply pipe that connects the mixing container to the pressure side of the turbocharger and is doubled-walled with an outer metal pipe and an inner tube, and

a protective gas between the outer metal pipe and the inner tube, the pressure of which is higher than atmospheric pressure, wherein a control unit controls the pressure pump so that a pressure in the water-alcohol supply pipe is at least 1 bar higher than the pressure of the protective gas.

9. The ship propulsion system as defined in claim 3, further comprising:

a control unit is configured to:

receive an indicated current power output of the internal combustion engine via its data interface,

increase an amount of hydrogen gas and oxygen gas set for the supply to the internal combustion engine in proportion to the magnitude of the indicated current power output,

wherein the electrolysis device is dimensioned so that the control unit sets a maximum producible amount of at least one of hydrogen gas and oxygen gas already at a power output threshold which designates a partial load that lies between 70% and 90% of a full-load operation of the internal combustion engine.

10. The ship propulsion system as defined in claim 3, further comprising:

a control valve connected to an outlet of the electrolysis device for at least one of oxygen and hydrogen gas, wherein the control valve opens a connection to the pressure side of the turbocharger when a pressure in the electrolysis device exceeds a settable opening pressure, and

the control unit is configured to set the opening pressure depending on a charge-air pressure behind the turbocharger.

11. The ship propulsion system as defined in claim 3, further comprising:

a plurality of internal combustion engines, which are a main engine and auxiliary engines of the ship,

the electrolysis device and the mixing container are connected to both the main engine and the auxiliary engines, and

a control unit (5) is configured to:

variably set whether the main engine and/or the auxiliary engines are supplied with the hydrogen gas, oxygen gas, water and alcohol, and

vary a ratio between the supplied hydrogen gas, oxygen gas, water and alcohol depending on whether the main engine or the auxiliary engines are being supplied.

12. The ship propulsion system as defined in claim 11,

wherein the turbochargers of the plurality of internal combustion engines provide different charge pressures,

wherein the control unit is configured to set the opening pressure of the control valve depending on the highest charge pressure, and

wherein an electrolysis gas line forks downstream of the control valve to the pressure areas of the plurality of internal combustion engines and a settable throttling is respectively provided.

13. The ship propulsion system as defined in claim 3, further comprising:

at least one boiler for burning a fuel,

a boiler line connecting the electrolysis device to the boiler, and

a control unit is configured to supply hydrogen gas and oxygen gas to the boiler when the latter burns fuel and a maximum producible amount of hydrogen gas and oxygen gas has not already been allocated to the at least one internal combustion engine.

14. The ship propulsion system as defined in claim 13, wherein the boiler line comprises an oxygen line and a hydrogen line separate therefrom, and

wherein the control unit is configured to set a ratio between the oxygen gas and hydrogen gas supplied to the boiler depending on a fuel currently being burned in the boiler.

15. A method for operating a ship propulsion system,
comprising the following steps:

burning a fuel in a combustion chamber of an internal combustion engine;

supplying fresh air to the combustion chamber via an intake tract;

compressing the fresh air by means of a compressor of a turbocharger in the intake tract;

producing hydrogen and oxygen gas for the internal combustion engine by means of an electrolysis device; and

supplying alcohols from an alcohol tank to the internal combustion engine, wherein the alcohols and water are supplied from a water tank on a pressure side of the compressor; and

wherein the hydrogen and oxygen gas of the electrolysis device are supplied on the pressure side of the compressor.